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ABSTRACT

The Developmental Studies Division of Thomas Nelson Community College provides developmental verbal and mathematics courses to enable inadequately prepared students to obtain the necessary knowledge and basic skills for entry into an associate degree program. A study was conducted to determine if those students who complete the objectives of the developmental courses can successfully compete with regular students in beginning credit English and mathematics courses and in grade point average. Analysis of the data revealed that five of the post-developmental groups performed above the acceptable level of 2.000, but two of the groups did not. Students who scored low on the Comparative Guidance and Placement test in both verbal skills and reading seemed to perform unsatisfactorily after completing Developmental Studies; standards for students in the developmental program were not as high as those of instructors teaching credit courses. Developmental students performed as well as regular students only in one beginning English course and one beginning math course. The mean GPA of post-developmental students in five beginning credit courses was lower than the mean GPA of regular students in the same courses. The number of hours completed by a student was a function of his GPA. Greater success in terms of GPA was evidenced by those who completed Verbal Studies alone than by any other sample group studied. (Author/KM)

A STATISTICAL COMPARISON OF SELECTED PERFORMANCES OF POST-DEVELOPMENTAL STUDENTS AND REGULAR STUDENTS ENROLLED IN CREDIT COURSES AT THOMAS NELSON COMMUNITY COLLEGE

A Research Report

Presented to

Dr. George M. Barton

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of the Requirements for the Degree

Doctor of Education

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SECTION I

STATEMENT OF THE PROBLEM

The open-door policy of community colleges in Virginia permits:

> . . . any person who has a high school diploma or the equivalent, or who is 18 years of age, and in any case is able to benefit from a program of instruction at Thomas Nelson Community College [to] be admitted to the College . . . (Thomas Nelson Community College Bulletin of Information, 1972-73, p. 8).

The implementation of this open-door policy has resulted in the acceptance of students who are academically deficient. In an attempt to assist in overcoming these deficiencies, a Developmental Studies Division was instituted in 1968 at Thomas Nelson Community College, Hampton, Virginia.

In order to assess whether or not the students who completed Developmental Studies at the College were adequately prepared to take college-level courses and could successfully compete with regular students, this study was undertaken to compare the grade distribution of post-developmental students with regular students in beginning credit English and mathematics courses. In addition, it proposed to compare the mean grade point average of post-developmental Verbal Studies and Reading Improvement students with regular students in credit courses over a seven-quarter period. Finally, it sought to compare the mean grade point average of two sample groups of students who scored low on the sentence section of the Comparative Guidance and Placement Test--one group which completed developmental Verbal Studies before enrolling in credit courses and one which took credit courses without enrolling in developmental Verbal Studies.

SECTION II

SCOPE AND LIMITATIONS

This study was not intended to be a comprehensive study of all aspects of the Developmental Studies Division at Thomas Nelson Community College, nor was it intended to research student variables which contributed to or hindered performance. The results of this study were limited to Thomas Nelson Community College students only and, therefore, should not be generalized to include students at other community colleges.

Factors which were not controlled in this study are stated below:

1. The total number of hours each quarter in which a student was enrolled;
2. The working student's responsibilities (hours worked, amount of responsibility involved);
3. The sex, marital status, number of dependents of a student, or his status as a dependent or head of the household;
4. The motivation and reason for enrolling in a specific course or courses;
5. The modes of instruction, the proficiency of the instructor, the reading level of the textbook, the hour the course was taken; and
6. Classes in which a student received a W, WP, R, or U.

SECTION III

SIGNIFICANCE OF STUDY

Ideally, one of the functions of American education is to offer educational opportunities to all citizens. In the past few years, increased attention has been turned to that segment of the student population which entered the community college in need of developmental courses:

> Students attend the community college because of its proximity to their homes, the low cost, the chance to take technical and vocational courses that are not available in the typical four-year academic program, the greater opportunity for individual counseling and remedial studies and--more than anything else--because the community college is not particular about whom it accepts. Though its students are of varying abilities, it is, especially in the urban setting, the last refuge of the educational down-and-outer, the haven of the scholastic ne'er-do-well (The New York Times Magazine, May 27, 1973, p. 12).

Although there were less than two dozen two-year colleges around 1900, today, 1973 there are 1,141 two-year educational institutions with a collective enrollment of 2,866,062 students (Ibid., p. 13). The need for community colleges to establish developmental programs was supported by Cross (1971), who found 92 per cent of respondents to her Spring, 1970 questionnaire offered remedial or developmental courses to upgrade verbal or other academic skills. Schenz reported a considerably lower estimate:

> A national survey of community colleges revealed the discouraging evidence that, although 91 per cent of the institutions espoused the concept of the open door, only 55 per cent provided programs appropriate for non-traditional students (Roueche, 1968, p. 42).

There exists a proliferation of initial pilot studies with only a few planned longitudinal studies to appraise the continued effects of the developmental programs. When the effectiveness of developmental programs was measured by the grades received in credit courses taken after completing developmental studies, results from across the nation were contradictory. Whether attrition rate, grade point average, the number of hours completed, or a developmental student's self-concept was studied, pilot projects have reported both positive and negative results. Therefore, each educational institution has sought to establish the effectiveness of its own program.

After five years of operation, a research study to assess the short- and long-term effects of the Developmental Studies Division at Thomas Nelson Community College was deemed beneficial. A statistical evaluation would aid in identifying the effectiveness of the Developmental Studies Division by studying the grades received by post-developmental students enrolled in credit courses.

At Thomas Nelson Community College prior to class registration, the Counseling Center administered the Comparative Guidance and Placement Test to every student. After an analysis by the Counseling Center of a student's high school transcript, his Comparative Guidance and Placement Test scores, and other data regarding his achievement level, the student was then admitted to a specific curriculum or advised to enroll in the Developmental Studies Division. The purpose of Developmental Studies was to provide "an opportunity to obtain needed knowledges and skills for an individual who is not fully prepared for entry into an associate degree program" (Thomas Nelson Community College Bulletin of Information, 1972-73, p. 47). After completing successfully

Verbal Studies, and/or Reading Improvement, and/or one or several mathematics courses, the student may enter the curriculum of his choice. If the student is able subsequently to succeed in courses of his choice, only then will the open-door policy be validated. "It is obvious that two-year colleges are going to have to accept the challenge of student learning as the one criterion for success in any remedial program" (Roueche, 1968, p. 51).

A review of related literature aided in designing this research report. In summary, the study proposed to assess the effectiveness of the Developmental Studies Division at Thomas Nelson Community College by analyzing the grades and grade point averages of post-developmental students in credit courses with those of regular students. It also compared the grade point averages in credit courses of two sample groups of students who scored low on the Comparative Guidance and Placement Test--one group completing Developmental Studies prior to enrollment in credit classes and one group directly entering credit classes.

SECTION IV

REVIEW OF RELATED LITERATURE

Community college developmental programs usually included English, and/or reading, and/or mathematics. Research studies often reported the findings of a total developmental program, rather than isolating the various areas within the program. The related literature will be reviewed in the following order: the results of total developmental studies programs, developmental English programs only, developmental mathematics programs only, and developmental reading programs only.

General. The open-door policy of the community-junior college has emphasized the opportunity of universal education for all. The open door then must acquire additional meaning beyond its implication of admittance for any high school graduate who applied. In a survey of developmental English courses in California junior colleges during the latter part of 1967, John Roueche (1967) reported that 91 per cent of junior colleges in that state were open-door colleges with an increasing enrollment of students in need of developmental courses. After much soul-searching by the community college family, the bailiwick of developmental education has been given a legitimate status and a responsible role at this level of the educational echelon.

The first year of college was often found to be a frustrating and unsatisfactory year for many students. Agatha Townsend estimated that if the percentage of dissatisfaction were generalized from one college to a national basis, the percentage would be a shocking 50 per cent. She advocated "frank and fearless appraisal" leading to "revolutionary changes in the curriculum and campus customs" (Townsend, 1956, p. viii).

An examination of the nature and extent of programs for academically disadvantaged students in the Commonwealth of Pennsylvania (October, 1971) concluded that these programs were "the mark of distinction for two-year colleges, for these programs extend the opportunity of upward mobility to those who feel 'shut out' and unable 'to make it' in our own society." (p. 41).

Townsend (1956), Roueche (1968), Cross (1971), and Schenz (1963) all agreed to a need for developmental courses to be offered at the community college level--even though their proven effectiveness appeared minimal as shown from the results of some studies undertaken. Roueche (1968), in working as a pioneer in community college research, made some severe judgments for developmental education. He repeatedly reiterated the need for community colleges to educate the disadvantaged, low-aptitude student. He characterized the objectives of the majority of studies in writing that "remediation means making-up--remedying--student deficiencies." In essence, the developmental program was viewed as providing a student with a second chance; an opportunity for a student to get from "where he is" to "where he wants to be" (pp. 21-22).

Evidence of this feeling among students was the example of Los Angeles City College students who expressed faith in the junior college to provide them with what the economy and social milieu had not allowed: an opportunity for a more productive life and the acquisition of needed self-esteem as students (Cohen, 1971). Therefore, Moore predicted that as long as developmental programs are needed, "community colleges should use the same commitment, establish the same priorities and use the same creativity in developmental programs for the disadvantaged" as has traditionally been accorded the gifted (Ferrin, 1971, p. 3). As Roueche

> The open-door concept is valid only if students are able to succeed in the educational endeavors. Currently, the only tenable value seems to be that enrollment allows a student to say, years after his short tenure, 'I went to college.' But except for this inestimable benefit, little else is apparent. And, until something is done to determine proper guidelines for teaching low-achieving students, much will continue to be left to chance (1968, p. 50).

He further summarized explicitly when he wrote, "Perhaps the junior colleges must now determine what students are going to learn in remedial programs, the conditions of learning, and how this learning can be evaluated" (Ibid.). In general, this is the route the majority of research reviewed has taken.

Bossone (1970) concluded that developmental programs and instructional processes have typically been organized on an intuitive basis, rather than a research basis. This "fly-by-the-seat-of-your-pants" approach was inadequate and inappropriate in any venture, but even more serious in light of the high attrition rates in developmental programs (Roueche, 1968).

John Roueche posed the critical question for developmental programs and their ambitious objectives. "Can a junior college remedial course rightfully expect to accomplish in one or two semesters what the public schools have failed to accomplish in twelve years?" (1967, p. 47). This most fundamental question he found unanswered with the result that developmental programs were designed by community junior colleges based on "unproved assumptions" resulting inevitably in unfulfilled objectives (Ibid., p. 48).

In general, studies of the effectiveness of developmental programs to implement the philosophy of the open door pointed to almost exclusive and disappointing failure, as the educationally disadvantaged student-

victim already knows. Some of these programs were well-intentioned and well-financed, but the results often showed that, despite the intentions and financial investments, the rate of success was so low as to call into question the justification for the continuation of these programs. The real tragedy in such programs' failures was the developmental student who was frustrated in his search to close the gap between himself and his deficient-free classmates in college. Again, Roueche directed thoughts to this problem in Salvage, Redirection, or Custody? "The large majority of students who enroll in remedial courses fail to complete these courses satisfactorily and are doomed to failure or forced to terminate their education" (1968, p. 7). At Los Angeles City College, Gooder (1967) found that the structure of the developmental courses was such that deficiencies of the students were not upgraded to the point of successful entry into academic credit courses.

Evidence of the ineffectiveness of developmental programs in correcting students' deficiencies existed in the study cited by Roueche (1968) of students who were low-achieving students in Bakersfield College Program O. The results revealed little difference as measured by grade point average between those students who were provided with special programs and/or counseling and students at another junior college who were also classified as low-achieving students but received no special attention of any kind. Students at Bakersfield College Program O did, however demonstrate greater student persistence than their counterparts.

Even more negative in its results was Losak's (1968) study at Miami-Dade Junior College. He found developmental programs failed to provide developmental students with any academic advantage whatsoever over similarly underprepared students who had not participated in the

developmental programs. Contrary to the Program O at Bakersfield College, Losak's investigation showed that developmental programs did not result in any greater persistence of students, nor were these programs effective in raising the grade point average during the second semester to the C level.

A recent profile of students at San Mateo College (1968) revealed that the students there saw themselves and the college readiness program in which they were enrolled in a negative light. Fifty per cent of these students abandoned the program before completing fifteen units of credit with a majority of new freshmen earning less than a 2.0 grade point average.

At the same college, students with low ability were identified for special counseling in order to improve their chances of success in college. Although these students did persist longer than the unidentified students, by the end of the first year, there were no longer any differences in the two groups. The identified students took fewer credit hours than those unidentified students, but grades did not improve substantially as the number of credit hours decreased.

As Richardson and Elsner concluded in their investigation of education for the disadvantaged:

> . . . if remedial courses are to have any chance of success, they must utilize specially trained instructors and cannot become the dumping grounds for a bewildering array of students not wanted in more academically respectable courses (1965-66, p. 19).

In screening entering students as to their readiness to enter credit courses, traditional procedures and instruments were used to assess these people. Knoell (1970) saw:

> . . . little or no evidence of undeveloped potential for learning in their profiles of scores on the traditional tests, particularly in areas deemed appropriate to the collegiate level of education. The disadvantaged student tends to be handicapped in a variety of ways when confronted with group tests of aptitude and achievement in common use in the schools . . . . A prior handicap is his basic lack of motivation to do well on the tests, in part because of his self-concept as a loser in school competition (Cohen, 1971, p. 55).

Placement testing for any group has been seriously questioned by Sheldon (1970) and Cohen:

> Since testing and other selection procedures usually apply to academic aptitudes and not to other qualities and, accordingly, can have negative effects on the expectations of certain students, we should look for different methods of appraisal and for alternative educational systems. Every person possesses both strengths and weaknesses. Do we honestly bother to look at both? (1971, p. 85).

The foregoing research has reviewed the problems involved in organization, need, and deficiencies of developmental programs. The research to follow pinpoints specific areas of English, mathematics, and reading.

English.. One of the areas of greatest need in developmental studies as identified by Losak (1972) was English. This need for developmental English was again clearly demonstrated in Richard Bossone's survey in 1966 of developmental English instruction in California public junior colleges. His report revealed that 70 per cent of incoming students failed the qualifying examination for the equivalent of a transfer English course. Yet, of the 80 per cent of students who enrolled in the developmental English course, only 20 per cent of them went on to the regular English course.

In an effort to discover the reasons for such a poor rate of progress, Bossone identified several factors that rendered the developmental English courses ineffectual. The list reads as follows:

1. Questionable placement procedures.
2. Lack of communication between those involved in testing or counseling and guidance and those involved in teaching of remedial English.
3. Oversized classes and overworked teachers.
4. Inadequately trained teachers and generally unenthusiastic teachers.
5. Outdated and superficial course outlines.
6. Vague objectives.
7. Lack of agreement about what should be taught in the course.
8. Lack of suitable instructional materials.
9. Confusion about proper methodology in remedial classes.
10. Lack of knowledge about students' reading and writing abilities and interests.
11. Lack of knowledge about students' personal problems, limitations, and preferences for methods and materials.
12. Variety of highly subjective grading standards.
13. High percentage of student failures.
14. Insufficient experimentation (Bossone, 1966, p. 32).

While developmental programs, such as those surveyed by Bossone in California, generally fail to give their students the equal footing in basic skills they are designed to accomplish, other studies of developmental programs in English contradict Bossone's negative findings. One of the most critical needs cited by college freshmen in Agatha Townsend's College Freshmen Speak Out is "the ability to write grammatically" (1956, p. 28). Despite Bossone's California survey of developmental English programs with its depressing statistical results, there are some achievements in this area, as, for example, the study of the effectiveness of developmental English for freshmen at Stout State University (Tokheim, 1968). Students who scored exceptionally low on the American College Testing Program in English were enrolled in a developmental English course. Of the 196 enrolled, 86.4 per cent received a passing grade. Of the 114 students who successfully completed developmental English, 64.1 per cent received a grade of C or

better in English 102A, the first credit course after the developmental English course. Of the original 101 English developmental students, 55.4 per cent went on to complete three semesters of English satisfactorily.

Contradictory results were recorded in yet another study at two Connecticut colleges (Sharon, 1970). At one college the developmental English program produced "modestly significant" results in raising grades in subsequent English courses. At the other college there were no significant results. What was statistically significant was the mean grade earned by developmental students in the first credit English course (2.27), whereas the control students, who ordinarily would have been classified as developmental but were placed in credit English without developmental work, earned a 1.85.

Frequently cited as a serious problem for developmental English courses was the muddled state of behavioral objectives for students to attain. Bloom's (1968) theories of setting clear behavioral objectives and utilizing experimental innovation in teaching developmental students were seen as important in other studies. In Jane Stevenson's (1970) study of English composition as part of the compensatory education system in Florida community colleges, the effort was to establish a "data base from which a model could be developed" for the improvement of such programs. Her recommendations were to order the subject matter of the course, making clear how the parts relate to the whole, and to identify how mastery of the subject matter will be deduced.

Virginia Highlands Community College (Vaughan and Puyear, 1972) implemented Bloom's (1968) learning theories in a laboratory situation. The results of the survey demonstrated that students using the laboratory achieved higher grade point averages after their developmental work than

undesignated others. Their methodology allowed students who needed developmental work to enroll in credit courses but to pursue laboratory work concurrently, mastering the objectives at their own rate. The approach began logically at the weakest point of a student's knowledge, rather than, arbitrarily, at the beginning of a predetermined course outline. An advantage of this approach was felt to be the clear diagnosis of the students' academic problems with measurable objectives to attain.

Present placement procedures have, likewise, been seriously questioned. As Sharon (1970) found in his study of the two Connecticut colleges developmental programs, substantial numbers of students, roughly two-thirds, who would ordinarily have been placed in developmental English, succeeded in passing regular English. Similarly, the percentage of developmental students passing regular credit English was larger than the percentage of control students, but not significantly so. In addition, the placement procedure was hard to evaluate since the failure rate in credit English (8 per cent) was so low.

In summary, the review of the literature concerning developmental English programs revealed mixed results. As a critical area for developmental students, developmental English courses have been proven effective in some instances. Recommended as areas to improve are the placement procedure and the practice of systematizing course objectives.

Mathematics. Losak (1972) identified mathematics as a second area of need in developmental programs. Roueche confirmed this need in the area of mathematics when he stated that "of the 60,500 students enrolled in California public junior college mathematics classes in the fall of 1964, three out of four students were taking courses offered in the high school" (1968, p. 13).

As community colleges have responded to the need for developmental mathematics programs, numerous factors were considered: placement procedures (including the psychological and sociological characteristics of students), various modes of teaching, and the use of teaching machines. The research reported considered each of these aspects which concerned students entering developmental mathematics programs.

Gagné (1965) emphasized the necessity of considering individual differences and behavioral principles when a program of progressive learning steps was designed for developmental students. Since individual learning begins at various levels and progresses to many plateaus at differing times, Gagné (1963) conducted experimental studies in the learning of mathematics which allowed each student to progress at his own rate. He wrote that a student was ready to learn something new when he had mastered the prerequisites or acquired the necessary capabilities through previous learning (Gagné, 1965). Problem solving was viewed as the most central condition of learning (Gagné, 1964). The results of Gagné's experimental studies implied that individual differences in students' abilities to perform a final task resided in their possession of previous knowledge. If students completed the program at their own rate, their performance at the end was found to be independent of ability scores measured before learning began and more highly dependent upon the specific basic knowledge they had learned (Gagné, 1963). In further studies, Gagné (1959) concluded that numerical ability was relatively independent of verbal and other conceptual abilities. It involved facility in handling numbers in arithmetic operations or otherwise, as usually measured by arithmetic tests. This ability facilitated performance on tasks involving memory for numbers, counting,

plotting on numbered coordinates, finding given numbers and related arithmetical operations.

In contrast to Gagne's findings regarding the relationship between mathematical ability and verbal abilities, Bittinger's (1972) research indicated that "language difficulties affect any type of mathematics learning." To help compensate for deficiencies in verbal skills, he suggested that various modes of instruction be utilized. He also warned that as a course moved from the lecture method to a self-study method, the demands for verbal skills associated with mathematics increased. Therefore, until the deficiencies in verbal skills have been eliminated, the modes of instruction should be carefully evaluated. Additional weight to this point of view was found in a paper presented by Rudolph (February, 1971) who, at the 1971 meeting of the American Educational Research Association, suggested that studies be undertaken to further examine relationships between reading comprehension and mathematical English.

Another area reported frequently in research literature concerning placement was that dealing with the need for adequate, critical evaluation procedures to assess the student's mathematical abilities. Meserve (1966) discussed the various capabilities and diversities of the incoming freshman student in developmental mathematics courses and the subsequent problems encountered in developing adequate placement procedures.

Placement studies have been concerned with such variables as the psychological and social factors related to developmental mathematics students (Small, 1966), previously acquired attitudes of freshmen students toward mathematics, and its relationship to grade performance

(Roberts, 1969). According to Kurtz's (1969) study, college counselors, even with their access to a student's records and standardized scores, have not been able to assign students appropriate mathematics courses. More often than not, the student was placed in a mathematics course too far above his level of performance. He concluded that proper placement could best be accomplished by the instructors who taught developmental math, even though their time would be extremely limited.

Burris (1971), Kurtz (1969), Meserve (1966), Bittinger (1972), and Small (1966) stressed the necessity of locating areas of mathematical deficiency by administering diagnostic tests, which could be subjected to a meaningful item analysis. These tests would be followed by a comprehensive test, covering each identified deficiency in order to assess as closely as possible the level of mathematics at which a student's learning must begin. In addition, Small (1966) felt the student's level of concrete-abstract thinking should be established in order to program adequately his projected learning experience. Burris (1971) added that another test should be administered by the instructor the first day of class to determine whether or not the student had been properly placed in that particular developmental level.

Another area of concern was the content of each course within specific developmental mathematics courses. Purdy (1971) strongly suggested that the overall course objectives be broken down into daily class objectives. Written instructional objectives would be an initial requirement of instructors. Then, these objectives would be met by completing various mathematics exercises and concluded with a daily self-test. These procedures, Purdy felt, would afford the student a sense of mastery and self-confidence, as well as translate course

objectives into measurable terms. The instructor would profit by this advance preparation and by the knowledge afforded him through the self-tests of the student's progressive learning stages.

The mathematics curriculum has been presented to developmental students in various ways with the research indicating that varied laboratory techniques were utilized by the majority of developmental programs. Hoffman (Fitzgerald, 1972), examining several programs, found that most shared the following:

1. A mathematics laboratory
2. The use of calculators "to help the student find his pattern of error in computation and to enable him to get past simple computational blocks to basic mathematical understanding;"
3. A structured program, with a pattern of activities for security but with a change of activities to meet the short attention span of the slow learner and the unit-a-day pattern for the satisfaction of a task completed and immediate evaluation;
4. Provision for reinforcement of early basic concepts;
5. The use of many manipulative devices, e.g., abacus, cuisenaire rods, geoboards;
6. "The proper and controlled use of games, puzzles, and other motivational techniques;" and
7. "Use, where possible, of remote terminals tied into computers for computer aided instructional units" (p. 13).

Research indicated that initial ideas relating the philosophy and possible advantages of using the laboratory method of teaching mathematics have been espoused, modified and utilized since the 1890's. Recent emphasis given to the laboratory method appeared to be the result of attempts to provide successful programs for unsuccessful and relatively unmotivated students (Ibid.).

Burlington County Community College (Burris, 1971) provided their developmental mathematics laboratory program with a materials distribution center, a testing center, and a study area with tutorial assistance and up-to-date learning aids. Like the studies that follow, student-teacher

contact in the classroom is minimal, generally serving to clarify rather than teach concepts. This college anticipates synthesizing the program into one pre-college-level mathematics developmental program in which a student will continuously enroll until he reaches a level where he functions effectively in the required mathematics courses of his particular curriculum. In this respect, each student will have completed only those units which he needs.

In a study by Nagel (1967), students scoring below 550 on the College Entrance Examination Board were placed in a Math 50 programmed course during the spring term, 1966. An effort was made to meet individual needs of the students by allowing them to work at their own rate and to compare the work covered by this technique with a lecture class. At the end of the semester, the amount of work covered by the programmed method was more significant. The failure rate, on the other hand, was about the same--between 10 per cent and 14 per cent for the lecture group and 9.6 per cent for the programmed instructions. Nagel felt that the significant outcome came in allowing students to accomplish a great deal more work in the same period of time, thus experiencing personal responsibility for their individual accomplishments.

Williams (1973), Roberts (1968), Douthitt (1973), and Nott (1971) found no statistically significant differences in the results of the laboratory method when compared with other modes of instruction.

Pasadena State College (Williams, 1973) opened a mathematics laboratory in 1970 for students using student-tutors and "section-meetings" with instructors. During the summer of 1972, a developmental program was added for the primary purpose of teaching community college students the initial concepts of mathematics. From a total of 2,481 students, 50 per cent were enrolled in mathematics. The laboratory

method did tend to increase "holding power" but did not appear to necessarily teach more mathematics to the students involved.

Milwaukee Area Technical College (Roberts, 1971) instituted a program to strengthen basic skills in mathematics and English for 56 inner city students. A mathematics learning center, equipped with carrels and areas for small groups to meet, was in operation utilizing individual tutors. Programmed materials were used which presupposed the ability of the students to do certain basic mathematical computations. As the students progressed, they were allowed to move from one learning group to another at their own rate. No statistical difference in learning rates resulted from this project, although the students expressed personal satisfaction and a sense of successful accomplishment from the programmed learning.

Students, registering for analytic geometry at Alvin Junior College in Texas, (Douthitt, 1973) were divided into "risk" and "nonrisk" students. "Risk" was the term used to designate those students who had achieved a score of less than 450 on the mathematics section and a total score of less than 900 on the Scholastic Aptitude Test. The "nonrisk" students attended the usual lecture-type course for three hours per week and the "risk" students attended a mathematics laboratory, consisting of individualized help, tutors, programmed texts, and other laboratory materials. The results of the study indicated no significant difference in learning as a result of the laboratory method.

Nott (1971) found a significant difference at the 0.05 level favoring the lecture method versus the programmed method at St. Petersburg Junior College. The programmed group received strictly programmed instructions. Lecture classes met for six weeks, while programmed

classes, in which students worked at their own pace, were from four to twelve weeks in length.

Although the null hypothesis was accepted for the majority of research dealing with laboratory methods, statistically significant results regarding the "contract method" were reported by Lee College Baytown, Texas (Perry, 1971). One hundred and two students participated in a study conducted in teaching developmental algebra by "contract method". Sixty-nine students participated in the experimental group and 33 in the control group. The time factor and the use of the programmed textbook along with a process called "Student Renegotiation" of contract was used. Results showed that the type of instruction received by students apparently helped prevent dropouts and failures. Out of the 69 students, 77 per cent were eligible for the second course; 68 per cent were eligible from the control group. The grade point average of the control group making use of contract grades was 3.21, while that of the experimental group was 2.42.

In summary, the review of the literature concerning developmental mathematics programs reveals both positive and negative results with negative results predominating. The research has primarily been pilot projects designed to test the effectiveness of innovative procedures in placement (taking into account psychological and sociological attributes as well as levels of placement), the systematization of written course objectives, various modes of instruction, and methods of measuring the short- and long-term results of developmental mathematics programs.

Reading. Reading is the third component of the developmental triad usually found in two-year colleges (Moore, 1971). The need for

developmental reading skills to accompany developmental English and mathematics was indicated in an eight-year study by Halfter and Douglas (McClellan, 1970). This longitudinal study of community colleges found that two-thirds of the students lacked the necessary reading skills to succeed in college courses. Goodwin (1971), in another summary of community colleges, reported that the reading level of students ranged from level 4 to level 15 and that one-half of all community colleges require reading if developmental work is required in English or mathematics. Corroboration was found in specific institutional research by Hagstrom (1971) and McClellan (1970). Hagstrom found 64 per cent of the students at Columbia Junior College and McClellan found 70 per cent of the students at Hillsborough Junior College reading below the college level of 13.

Hage and Stroud (1959), Gibson (1965), and Woolf and Woolf (1957) agreed that intelligence of the prospective reader was of utmost importance in identifying reading proficiency, interest in reading and some prediction of academic achievement. Research by Bond and Fay (1950), Monroe (1972), and Strang (1943) showed that the relationship of reading achievement and intelligence was a major factor in all levels of reading with this factor becoming more pronounced at higher levels of education. According to Woolf and Woolf (1957), use of intelligence tests as a part of a battery of tests--achievement, interests, abilities, needs--along with the judgment of the instructor was considered essential to the adequate placement of students.

The importance of background information about students was shown to be of importance in a study of reading and English students in the six Community Colleges of City University of New York:

> A high correlation between reading and study problems and physical, psychological, intellectual, and environmental factors, such as physical fatigue, ability to concentrate on and understand assignments . . . (Bossone, 1970, p. 3).

One of the problems reiterated in the literature was the readability of texts for the persons who had already experienced difficulty in reading. Two studies by Cline (1971) and Hagstrom (1971) showed the reading level of the majority of textbooks to be above the reading level of the majority of students who used the books. Cline's population was comprised of 279 students from the freshmen class of a private college in mid-Missouri. Using The Nelson Denny Reading Test and the Dale-Chall Readibility Formula, 17 textbooks were studied--11 above the level of 52 per cent of the students, and 7 above the level of 75 per cent of the students.

Hagstrom's (1971) population consisted of a random sampling of 359 students drawn from Columbia Junior College in California. Twenty-nine textbooks were analyzed using the Dale-Chall Readability Formula and 14 of the textbooks were found to be more than one grade level above that of the students. According to Mallinson (McClellan, 1970), the textbook should be one level below the reading level of the student. In Hagstrom's study, five of the textbooks were written on grade level 16+. However, of his population, only 35.9 per cent had an initial reading grade placement of 13 and above, thus rendering the textbooks of little value to the students using them.

Developmental reading programs seem to emphasize one of three approaches:

1. Teaching generalized reading skills, such as vocabulary, rate of reading, context clues, and instructional analysis (McDonald and Byrne, 1958);

2. "Content area reading" or teaching reading in relation to college credit courses (Twining, 1972);

3. Teaching reading by the use of mechanical devices, such as teaching machines, workbooks, tachistoscopes and pacers (McDonald and Byrne, 1958).

According to Austin, Bush, and Huebner (1961), these programs are difficult to evaluate because of the lack of adequate means of measuring comprehension. Hill (1960), Smith and Wood (1955), Jackson (1955), Robinson (1946), and Sawyer (1961) found moderate to high correlations between reading improvement and improvement of grades. Roy (1965), Gold (1968), and Maginnis (1970) reported that their research showed retention of gains without significant loss for periods ranging from three months to six semesters.

However, enrollment in reading improvement and study skills courses did not always result in high grade point averages. Murphy and Davis (1949), Preston and Botel (1952), Schneyer (1963), Vineyard and Bailey (1960), and Losak (1968) showed low correlations between reading improvement courses and grade point averages.

In summary, the studies and surveys reported in yearbooks have depicted the strides made in student reading improvement. Meanwhile, other studies compared groups of students to determine whether better grades had been made by students who had previously enrolled in developmental reading courses than students who had not had such courses (Lee, 1964). Some research showed that low or negative correlations did yield important effects, such as gains in average marks which approached statistical significance.

Summary. The review of the literature indicated the need for developmental programs and the responsibility of two-year community colleges to provide such programs. In large part, the studies thus far

reported were short-term, pilot studies which revealed both positive and negative results as to the effectiveness of such programs. The final consensus, however, remained that there was an undeniable need for these programs in light of the community college's open-door policy. The only question, therefore, was how to equip the developmental student with the skills needed to compete successfully with the regular student in academic credit courses. Among the critical areas pointed out of immediate improvement were (1) the placement procedure, (2) the pre- and post-testing of the developmental student, (3) the need for special counseling for the developmental student, (4) the establishment and clarification of course objectives for each developmental course, (5) the flexibility and operation of each developmental course on an individualized basis, and finally, (6) the specialized training for developmental faculty.

SECTION V

STATEMENT OF HYPOTHESES

The Developmental Studies Division at Thomas Nelson Community College, which has been in operation since the inception of the College five years ago, has attempted to meet the needs of students who have deficiencies in English, mathematics and reading. The need for developmental studies programs in community colleges throughout the nation has been clearly demonstrated, although related research reports conflicting evidence regarding the effectiveness of these programs. This study proposed the following 15 hypotheses in an effort to evaluate the academic standing of post-developmental students in credit courses at Thomas Nelson Community College. These hypotheses considered both short- and long-term results in terms of grades received and mean grade point averages.

Hypothesis I. Post-developmental students do not perform as well as regular students in terms of mean grade received in English 101.

Hypothesis II. Post-developmental students do not perform as well as regular students in terms of mean grade received in English 111.

Hypothesis III. Post-developmental Verbal Studies students enrolled in English 101 and English 111 the quarter following the completion of Developmental Studies do not perform as well as regular students enrolled in English 101 and 111 in terms of grade point average.

Hypothesis IV. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 111.

Hypothesis V. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 121.

Hypothesis VI. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 141.

Hypothesis VII. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 151.

Hypothesis VIII. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 161.

Hypothesis IX. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 181.

Hypothesis X. Post-developmental mathematics students, enrolled in Mathematics 151, 161 and 181 the quarter following the completion of Developmental Studies, do not perform as well as regular students enrolled in Mathematics 151, 161 and 181 in terms of grade point average.

Hypothesis XI. Post-developmental Verbal Studies students do not perform as well as regular students in terms of grade point average over a seven-quarter period following the completion of Developmental Studies.

Hypothesis XII. Post-developmental Reading Improvement students do not perform as well as regular students in terms of grade point average over a seven-quarter period following the completion of Developmental Studies.

Hypothesis XIII. Post-developmental students who complete Verbal Studies/Reading Improvement do not perform as well as regular students in terms of grade point average over a seven-quarter period following the completion of Developmental Studies.

Hypothesis XIV. Post-developmental Verbal Studies students do perform better in terms of grade point average over a seven-quarter period than students with low Comparative Guidance and Placement Test scores who do not enroll in developmental Verbal Studies.

Hypothesis XV. Post-developmental Verbal Studies students do perform better in terms of grade point average over a seven-quarter period than they do for the quarter following the completion of Developmental Studies.

SECTION VI

BASIC ASSUMPTIONS

The following basic assumptions were considered to be valid but were not verified in this study:

A. The sample groups were representative of the total populations from which they were drawn.

B. Grades received in subject areas and grade point averages were interval data.

C. The samples used to test each hypothesis were independent groups.

D. The sample populations did not constitute normal distributions.

E. A student without adequate verbal and English skills would not be able to read and comprehend a college-level textbook, workbook, or various other media.

F. Most courses required a significant measure of independent study, e.g., textbook assignments, handouts, term papers.

G. Verbal and English skills were necessary to answer essay tests.

H. Verbal skills (i.e., reading improvement and comprehension) were necessary to read and answer objective tests.

I. Comprehension and organizational skills were necessary to take notes from lectures and discussions.

J. A student without basic mathematical skills would not be able to perform in college-level mathematics courses.

K. Subject grades and grade point average were adequate measures of a student's learning.

SECTION VII

DEFINITION OF TERMS

Since words often have different connotations, the following terms have been given operational definitions and all writings in this research report will use these definitions as referents.

Adequately prepared. To be adequately prepared was considered to be proficient in the skills necessary for the performance of the requirements of a course at the time of registration.

Comparative Guidance and Placement Test, (CGP). The Comparative Guidance and Placement Test was a combination aptitude and achievement test; an ability test used as a tool in the placement of students at Thomas Nelson Community College.

Cumulative Grade Point Average, (GPA). To determine the cumulative grade point average, the total number of grade points earned in courses was divided by the total number of credits attempted, on a scale of A = 4.0, B = 3.0, C = 2.0, D = 1.0, and F = 0.0.

Developmental student. A developmental student was a student enrolled in any developmental course or courses at Thomas Nelson Community College.

Developmental Studies Program. The Developmental Studies Program was a non-credit program designed to help develop the basic skills and understandings necessary to succeed in other programs at the Community College. These skills included reading, writing, oral expression, and mathematics.

Disadvantaged student. A disadvantaged student was a student who was not considered proficient in the skills necessary for the performance of the requirements of a course at the time of registration.

High-risk student. A high-risk student was one who was not considered proficient in the skills necessary for satisfactory performance in credit courses and who had a relatively high probability of becoming a dropout if he was not enrolled in Developmental Studies.

Low Comparative Guidance and Placement Test Score, (low CGP). A low Comparative Guidance and Placement Test Score was considered a raw score under 45 on the sentence section.

Open-door policy. The open-door policy of the Community Colleges in Virginia was described in the Thomas Nelson Community College Bulletin of Information, 1972-73 (p. 8) as admittance for:

> Any person who has a high school diploma or the equivalent, or who is 18 years of age, and in any case is able to benefit from a program of instruction at Thomas Nelson Community College . . .

Performance. Performance was the grade received by the student upon completion of a course, (i.e., A, B, C, D, F, WF, S, R, or U).

Post-developmental student. A student who had successfully completed a course or courses in Developmental Studies.

Reading Improvement. Reading Improvement was a developmental course designed to increase the student's vocabulary, comprehension, and reading rate.

Remedial student. A remedial student was one enrolled in any developmental course or courses at Thomas Nelson Community College.

Successfully completed. A successfully completed course was one in which a student received a grade of A, B, C, or S; (D, F, WF, R, and " were not considered as successful levels of competencies).

Verbal Studies. Verbal Studies was a course in composition designed for students who needed help in the areas of verbal skills and writing in order to bring their proficiency to the level necessary for entrance into their respective curricula.

SECTION VIII

PROCEDURES FOR COLLECTION AND TREATMENT OF DATA

All data needed for this study were on file in the Office of Admissions and Records at Thomas Nelson Community College. These data were made available through the cooperation of Mr. Ernest J. Edmands, Coordinator of Admissions and Records at the College.

Hypotheses I through X. Procedures to secure the data for Hypotheses I through X were as follows:

A. Appropriate class rolls were checked to determine sample populations. During Fall Quarter 1972, Mathematics 111 had no post-developmental students enrolled; Mathematics 121 had only two post-developmental students enrolled, and Mathematics 141 was not offered. Therefore, Hypotheses IV, V and VI were eliminated from this study.

B. Student permanent record files were examined to:

   1. Determine status (post-developmental or regular student);

   2. Record quarterly grade or grades for English 101, 111, Mathematics 151, 161 and 181;

   3. Record total credits completed; and

   4. Record Fall Quarter 1972 grade point averages.

C. The total grade distribution in credit courses for Fall, 1972 were secured from the Office of Admissions and Records.

Procedures to treat the data for Hypotheses I through X were as follows:

A. Grade distributions were totaled for post-developmental and regular students in initial English and Mathematics courses, e.g., English 101, 111, Mathematics 151, 161 and 181.

B. The mean for each grade distribution was calculated for post-developmental and regular students in each course.

C. A t-test with a 0.05 level of significance was calculated for each hypothesis.

D. To obtain the adjusted grade distribution of the total student body for Fall Quarter, 1971, the grade distribution of post-developmental students was subtracted from the total.

Hypotheses XI through XV. Procedures to secure the data for Hypotheses XI through XV were as follows:

A. The quarterly grade reports from Fall, 1970 through Spring, 1971 were secured from the Office of Admissions and Records. Students, who enrolled in only one developmental course, Verbal Studies, and who successfully completed it with a grade of S, constituted the sample population for Hypothesis XI. Eight students enrolled in only one developmental course, Reading Improvement, and successfully completed it with a grade of S. Since eight students were insufficient to constitute a sample population, Hypothesis XII was eliminated.* Students who enrolled in developmental Verbal Studies/Reading Improvement and who successfully completed both with grades of S, constituted the sample population for Hypothesis XIII. (See Figure 1, Page 35).

B. Using the records of the Counseling Center, a sample population was drawn of students who had a raw score below 45 on the sentence section of the CGP tests administered between Fall, 1970, and Spring, 1971. The sample population secured from the CGP scores was checked against the class rolls to identify those students who did or did not enroll in developmental Verbal Studies.** A comparison of the performance in credit courses between two sample populations was shown to test Hypothesis XIV. (See Figure 1, Page 35).

1. Students who had a raw score below 45 on the sentence section of the CGP and who successfully

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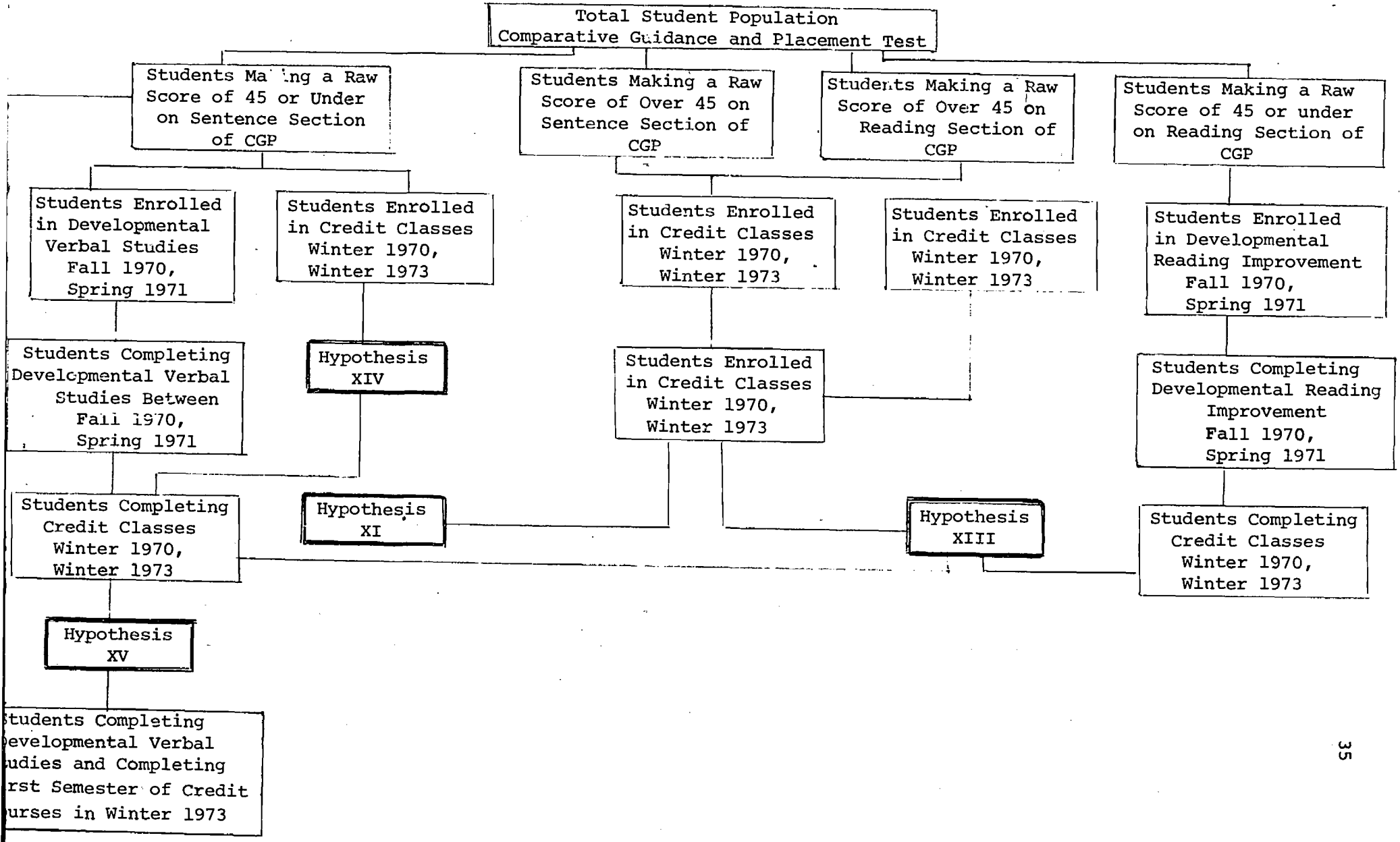
*It was found that students who were usually deficient in reading skills were also deficient in verbal skills and were, therefore, counseled to enroll in and to complete both Verbal Studies and Reading Improvement.

**A student with a raw score above 45 on the sentence section of the CGP was not advised by the Counseling Center to take the Verbal Studies course; if a student had a raw score below 45, but had a good high school GPA, he was not usually advised to take developmental courses; if a student had a raw score below 45 and had a low high school GPA, he was advised to take developmental courses.

FIGURE 1

SCHEMA OF SAMPLE POPULATIONS
FOR HYPOTHESES XI, XIII, XIV, AND XV



completed Verbal Studies before entering credit courses constituted one sample population.

2. Students who had a raw score below 45 on the sentence section of the CGP and who entered credit courses without taking Verbal Studies constituted the second sample population.

C. The sample populations used to test Hypothesis XV were the post-developmental Verbal Studies students used in Hypotheses III and XI.

D. The permanent records of the four selected sample populations were checked to obtain:

1. A listing of the credit courses completed after finishing their developmental course or courses;

2. The grades received in each subject area;

3. The last cumulative GPA's recorded; and

4. The total number of quarter hours completed.

E. Courses to be recorded began with the first academic quarter of the school year after a student completed his developmental course or courses; and ended with the last recorded grade reports. i.e., Winter, 1971, through Winter, 1973.*

F. The total grade distribution in credit courses from Winter, 1971, through Winter, 1973, was secured from the Thomas Nelson Community College Annual Reports (1970-1971 and 1971-1972), and from the Office of Admissions and Records.

Procedures to treat the data for Hypotheses XI through XV were as follows:

A. After isolating the four sample populations and recording the grades received, the grade distributions (A, B, C, D, or F, WF) for each subject area were totaled.

B. Subject areas were categorized under the five curriculum divisions and grade distributions were totaled for each of the four sample populations.

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*It was felt that seven quarters would allow for the initial adjustment of students enrolling in credit courses for the first time and also yield variability of student performance.

These grade distributions were converted to percentage distributions. The mean and median of the total quarter hours completed were calculated.

C. A scattergram was drawn to depict the cumulative GPA and total number of hours completed by each of the four sample populations.

D. To obtain the adjusted grade distributions of the total student body from Fall, 1970, through Winter, 1972, the grade distribution of each of the four sample populations being compared to the student body was subtracted from the total. The subtrahend varied according to the group under consideration, e.g., Verbal Studies, or Verbal Studies/Reading Improvement. The mean and percentage distribution of the grades of the adjusted sample populations were calculated.

E. A z-test was calculated for the mean grade distributions for Hypotheses XI, XIII, XIV, and XV. This test established whether or not there was a significant difference between the means.

SECTION IX

PRESENTATION OF DATA

The presentation of data was grouped according to subject areas: Hypotheses I, II and III concerned English and Hypotheses VII, VIII, IX and X concerned mathematics. The presentation of data for Hypotheses XI, XIII, XIV and XV concerned the subject areas of English and Reading Improvement.

Descriptive Data of Hypotheses I, II and III. Out of the total population of students enrolling in English 101 during Fall Quarter, 1972, a sample population of 23 post-developmental students (S-1) was selected, and a sample population of 218* regular students (S-2) was selected in order to test Hypothesis I.

Out of the total population of students enrolling in English 111 during Fall Quarter, 1972, a sample population of 20 post-developmental students (S-3) was selected, and a sample population of 262* regular students (S-4) was selected in order to test Hypothesis II.

To test Hypothesis III, S-1 and S-3 were combined to establish sample population S-5. To establish sample population S-6, S-5 was subtracted from the total number of students enrolled in credit courses during Fall Quarter, 1972.

Hypothesis I. Post-developmental students do not perform as well as regular students in terms of mean grade received in English 101.

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*Data were not available on regular students for the selection of a representative random sampling; therefore, all regular students enrolled in English 101 and English 111 were used as sample populations.

Null Hypothesis: H_o The mean grade of post-developmental students equals the mean grade of regular students in English 101. $(\bar{X}_1 = \bar{X}_2)$

Alternative Hypothesis: H_a $\bar{X}_1 \neq \bar{X}_2$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 1

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-1 AND S-2

	S-1		S-2
$\bar{X}$	1.78		2.53
s.d.	1.14		0.924
N	23		218
$\bar{X}_1 - \bar{X}_2$		0.750	
z-score		3.138*	

*(Significant at the 0.05 level).

Table 1 shows z = 3.138. Since $z > 1.96$, H_o was rejected at the 0.05 level of significance. The alternative hypothesis H_a was accepted. There was a significant difference between the mean grade of the two groups. The regular student performed better in English 101 than the post-developmental student. (See Appendix 1, page 105).

Hypothesis II. Post-developmental students do not perform as well as regular students in terms of mean grade received in English 111.

Null Hypothesis: H_o The mean grade of post-developmental students equals the mean grade of regular students in English 111. $(\bar{X}_3 = \bar{X}_4)$

Alternative Hypothesis: H_a $\bar{X}_3 \neq \bar{X}_4$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 2

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-3 AND S-4

	S-3		S-4
$\bar{X}$	2.100		2.25
s.d.	1.179		1.106
N	20		262
$\bar{X}_3 - \bar{X}_4$		0.15	
z-score		0.547*	

*(Not significant at the 0.05 level).

Table 2 shows z = 0.547. Since $z < 1.96$, H_o was accepted at the 0.05 level of significance. There was no difference between the mean grades of the two groups. Post-developmental students performed as well as regular students in English 111. (See Appendix 2, page 106).

Hypothesis III. Post-developmental Verbal Studies students enrolled in English 101 and English 111 the quarter following the completion of Developmental Studies, do not perform as well as regular students enrolled in English 101 and 111 in terms of grade point average.

Null Hypothesis: H_o The grade point average between post-developmental students enrolled in English 101 and 111 for the quarter following the completion of Developmental Studies equals the grade point average of regular students enrolled in English 101 and 111. ($\bar{X}_5 = \bar{X}_6$)

Alternative Hypothesis: H_a $\bar{X}_5 \neq \bar{X}_6$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 3

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-5 AND S-6

	S-5		S-6
$\bar{X}$	2.015		2.532
s.d.	1.073		0.951
N	43		480
$\bar{X}_5 - \bar{X}_6$		0.517	
z-score		3.041*	

*(Significant at the 0.05 level).

Table 3 shows $z = 3.041$. Since $z > 1.96$, H_o was rejected at the 0.05 level of significance. The alternative hypothesis H_a was accepted. There was a significant difference in the grade point average between the two groups. Regular students performed better than post-developmental students. (See Appendix 3, page 107).

Descriptive Data of Hypotheses VII, VIII, IX and X. It was the intention in this part of the study to compare post-developmental students with regular students in three beginning credit mathematics courses.

Out of the total population of students enrolling in Mathematics 151 during Fall Quarter, 1972, a sample population of 29 post-developmental students (S-7) was selected, and a sample population of 104* regular students (S-8) was selected in order to test Hypothesis VII.

*Data were not available on regular students for the selection of a representative random sampling; therefore, all regular students enrolled in Mathematics 151 were used as the sample population.

Out of the total population of students enrolling in Mathematics 161 during Fall Quarter, 1972, a sample population of 17 post-developmental students (S-9) was selected, and a sample population of 36* regular students (S-10) was selected in order to test Hypothesis VIII.

Out of the total population of students enrolling in Mathematics 181 during Fall Quarter, 1972, a sample population of 32 post-developmental students (S-11) was selected, and a sample population of 61* regular students (S-12) was selected in order to test Hypothesis IX.

To test Hypothesis X, S-7, S-9 and S-11 were combined to establish sample population S-13. To establish sample population S-14, S-13 was subtracted from the total number of students enrolled in credit Mathematics courses during Fall Quarter, 1972.

Hypothesis VII. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 151.

Null Hypothesis: H_o The mean grade of post-developmental students equals the mean grade of regular students in Mathematics 151. ($\bar{X}_7 = \bar{X}_8$)

Alternative Hypothesis: H_a $\bar{X}_7 \neq \bar{X}_8$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

Table 4 indicates $z = 2.186$. Since $z > 1.96$, H_o was rejected at the 0.05 level of significance. The alternative hypothesis H_a was accepted. There was a significant difference between the mean grade of the two groups. The regular students performed better in Mathematics 151 than the post-developmental students. (See Appendix 4, page 108).

*Data were not available on regular students for the selection of a representative random sampling; therefore, all regular students enrolled in Mathematics 161 and 181 were used as sample populations.

TABLE 4

DATA FOR z-TEST OF SIGNIFICANCE FOR
SAMPLE GROUPS S-7 AND S-8

	S-7		S-8
$\bar{X}$	2.069		2.587
s.d.	1.136		1.132
N	29		104
$\bar{X}_7 - \bar{X}_8$		0.418	
z-score		2.186*	

*(Significant at the 0.05 level).

Hypothesis VIII. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 161.

Null Hypothesis: H_o The mean grade of post-developmental students equals the mean grade of regular students in Mathematics 161. ($\bar{X}_9 = \bar{X}_{10}$)

Alternative Hypothesis: H_a $\bar{X}_9 \neq \bar{X}_{10}$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 5

DATA FOR z-TEST OF SIGNIFICANCE FOR
SAMPLE GROUPS S-9 AND S-10

	S-9		S-10
$\bar{X}$	1.47		2.44
s.d.	1.091		1.092
N	17		36
$\bar{X}_9 - \bar{X}_{10}$		0.97	
z-score		3.021*	

*(Significant at 0.05 level).

Table 5 indicates z = 3.021. Since $z > 1.96$, H_o was rejected at the 0.05 level of significance, and the alternative hypothesis H_a was accepted. There was a significant difference between the grades of the two groups. The regular students performed better in Mathematics 161 than the post-developmental students. (See Appendix 5, page 109).

Hypothesis IX. Post-developmental students do not perform as well as regular students in terms of mean grade received in Mathematics 181.

Null Hypothesis: H_o The mean grade of post-developmental students equals the mean grade of regular students in Mathematics 181. $(\bar{X}_{11} = \bar{X}_{12})$

Alternative Hypothesis: H_a $\bar{X}_{11} \neq \bar{X}_{12}$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 6

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-11 AND S-12

	S-11		S-12
$\bar{X}$	2.531		2.852
s.d.	0.728		0.935
N	32		61
$\bar{X}_{11} - \bar{X}_{12}$		0.321	
z-score		1.824*	

*(Not significant at 0.05 level).

Table 6 indicates z = 1.824. Since $z < 1.96$, H_o was accepted at the 0.05 level of significance. There was no difference between the mean grades of the two groups. Post-developmental students performed as well as regular students in Mathematics 181. (See Appendix 6, page 110).

Hypothesis X. Post-developmental mathematics students, enrolled in Mathematics 151, 161 and 181 the quarter following the completion of Developmental Studies, do not perform as well as regular students enrolled in Mathematics 151, 161 and 181 in terms of grade point average.

Null Hypothesis: H_o Grade point average of post-developmental students enrolled in Mathematics 151, 161 and 181 the quarter following the completion of Developmental Studies equals the grade point average of regular students enrolled in Mathematics 151, 161 and 181. ($\bar{X}_{13} = \bar{X}_{14}$)

Alternative Hypothesis: H_a $\bar{X}_{13} \neq \bar{X}_{14}$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 7

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-13 AND S-14

	S-13	S-14
$\bar{X}$	2.295	2.776
s.d.	0.659	0.815
N	78	201
$\bar{X}_{13} - \bar{X}_{14}$	0.481	
z-score	4.373*	

*(Significant at 0.05 level).

Table 7 indicates z = 4.373. Since $z > 1.96$, H_o was rejected at the 0.05 level of significance, and H_a was accepted. There was a significant difference between the grade point average of the two groups. The regular students performed better in terms of total grade point average for the quarter than the post-developmental students. (See Appendix 7, page 111).

Hypothesis XI. Post-developmental Verbal Studies students do not perform as well as regular students in terms of grade point average over a seven-quarter period following the completion of Developmental Studies.

Descriptive Data of S-15. All students who enrolled in and successfully completed developmental Verbal Studies from Fall, 1970, through Spring, 1971, were selected as sample population S-15. The College transcripts of 49 students, constituting S-15, were studied for seven quarters (Winter, 1971, through Winter, 1973) to determine the number of hours each student completed, the GPA's and the grade distribution by subject areas within divisions. If a student in S-15 completed less than seven quarters, his GPA was recorded for the last quarter in which quality points were earned.

GPA And Number Of Hours Completed. The total number of hours completed and the GPA for each student in S-15 are shown in Appendix 8 (A), page 112, and depicted by the Scattergram in Appendix 8 (B), page 113. Forty-nine students completed an average of 39.8 quarter hours over the seven quarters studied. The credit hours showed a range from 1 through 106; the range of GPA's was from 0.250 to 3.708. Table 8, page 47, shows that the average GPA increased from below the grade D through the grade C, while, concomitantly, the average number of hours completed also increased from 1.8 to 53.4. Above this level, the GPA increased to a 3.260; however, the number of hours completed decreased slightly to 50.9. The mean GPA for this group of 49 students was 2.262.

Grade Distribution By Divisions And Subject Areas. Table 9, page 49, shows the percentage distribution of grades by divisions and Figure 2, page 48, graphically presents this data. The grade distribution by subject areas is shown in Appendix 8 (C), Page 114, and

Appendix 8 (D), Page 115, shows the divisional grade distribution by subject areas.

TABLE 8

CUMULATIVE GRADE POINT AVERAGE AND NUMBER OF HOURS COMPLETED BY S-15 FOR SEVEN QUARTERS

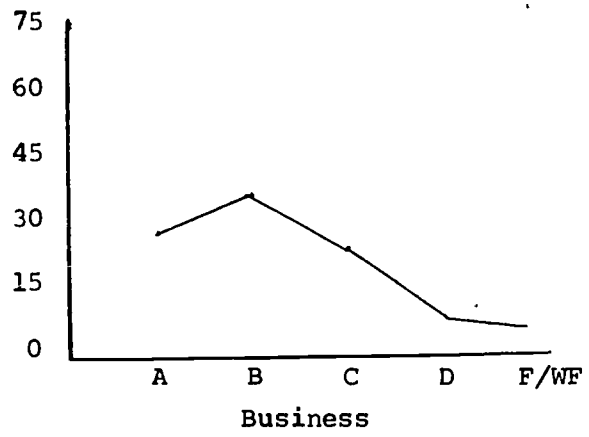
Interval GPA	No. of Students	No. of Hours Completed	Avg. No. of Hrs. Completed	Mean GPA
0.000 - 0.999	4	7	1.8	0.570
1.000 - 1.999	16	432	27.0	1.576
2.000 - 2.999	14	747	53.4	2.459
3.000 - 4.000	15	764	50.9	3.260
TOTALS	49	1,950	39.8	2.262

As depicted in Figure 2, page 48, Engineering Technologies peaked with 52 per cent A's, the Public Services Division with 50 per cent B's, and the Communications and Humanities with 44 per cent C's. There were three noticeable peaks in the Business Division with 27 per cent A's, 34 per cent B's, and 25 per cent C's. The Natural Sciences and Math Division followed a similar pattern with 26 per cent A's, 30 per cent B's, and 27 per cent C's. For all five divisions, the mean percentage of A's and B's combined was 56 per cent, C's 29 per cent, and D's and F/WF's combined totaled 15 per cent.

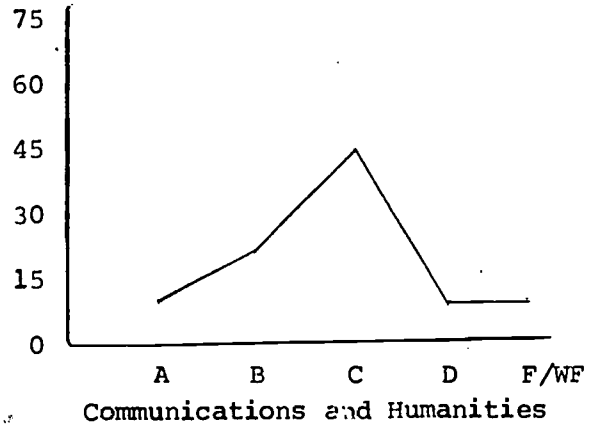
In 28 of the 31 subject areas completed, S-15 earned a C or higher GPA. The exceptions were in secretarial science, speech/drama, and biology, constituting only 48 out of 1,950 quarter hours completed. In 10 of the 31 subject areas completed, a mean GPA of a B or higher was earned, which comprised 124 out of 1,950 quarter hours completed.

FIGURE 2

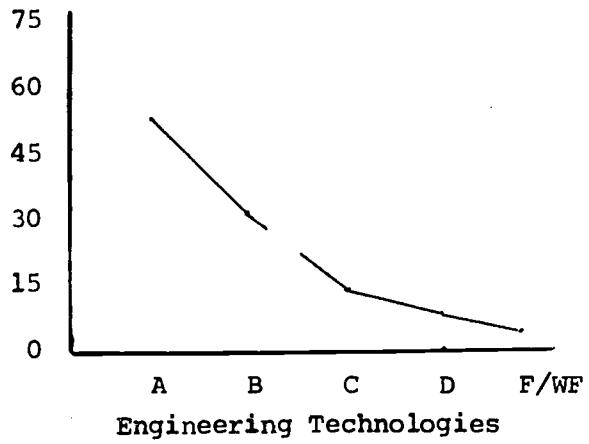
POLYGONS DEPICTING PERCENTAGE GRADE DISTRIBUTION BY DIVISIONS FOR S-15



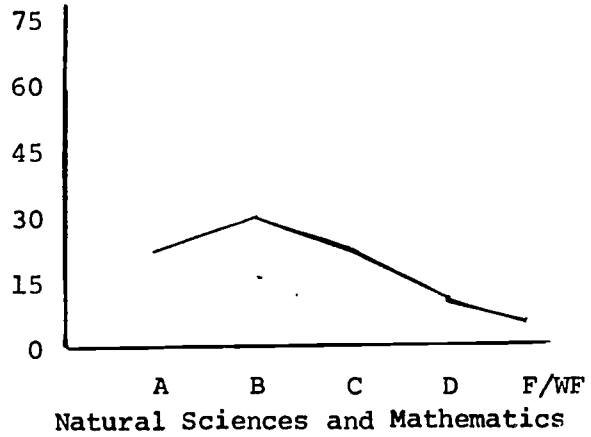
Business



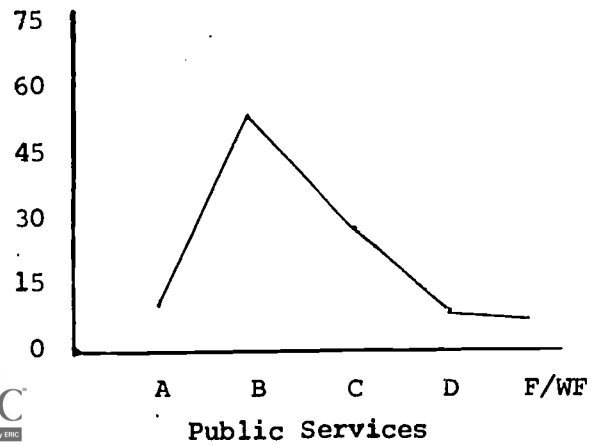
Communications and Humanities



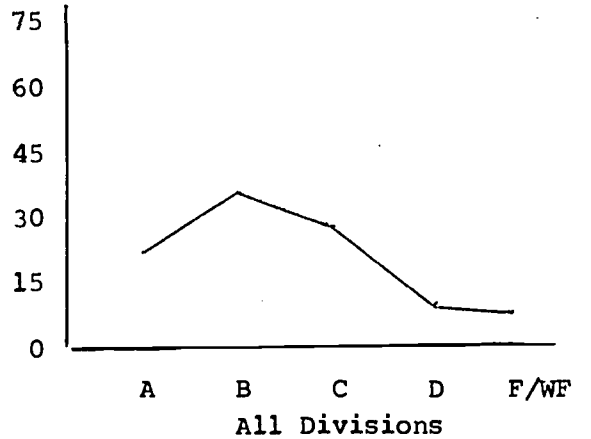
Engineering Technologies



Natural Sciences and Mathematics



Public Services



All Divisions

TABLE 9

PERCENTAGE DISTRIBUTION OF GRADES
BY DIVISIONS FOR S-15

Division	A	B	C	D	F/WF	Mean GPA
Business	27%	34%	25%	8%	6%	2.687
Communications and Humanities	11%	25%	44%	10%	10%	2.178
Engineering Technologies	52%	30%	14%	0%	4%	3.268
Natural Sciences and Mathematics	26%	30%	27%	11%	6%	2.470
Public Services	9%	50%	27%	8%	6%	2.586
GRADE DISTRIBUTION	22%	34%	29%	8%	7%	
DIVISIONAL MEAN						2.638
MEAN GRADE DISTRIBUTION						2.563
MEAN GPA FOR S-15						2.262

Descriptive Data For S-16. Between Winter, 1971, and Winter, 1973 15,483 full- and part-time students completed 111,361 quarter hours (estimating three quarter hours per grade) with a mean GPA of 2.577. The total grade distribution appears in Table 10, page 50.

To compare the GPA's of S-15 with regular students (S-16), the grade distribution for all students was tabulated for seven quarters. When the grade distribution of the subjects of S-15 was subtracted from those of the total student body, the grade distribution for S-16 was calculated. See Table 10, page 50.

z-Test Of Significance For S-15 And S-16. To determine if the relationship between the mean grade distribution of S-15 and S-16 differed significantly and to establish if the differences in the two sample means could be accounted for by chance variables, a z-test of significance was calculated. The results follow Table 10, page 50.

TABLE 10

GRADE DISTRIBUTION OVER SEVEN QUARTERS
FOR SAMPLE GROUPS S-15 AND S-16

	A	B	C	D	F/WF	Total
Total Population	9,627	13,287	11,173	3,490	2,858	40,435
S-15	- 145	- 225	- 188	- 50	- 40	- 648
S-16	9,482	13,062	10,985	3,440	2,818	39,787

Null Hypothesis: H_o The mean grade point average of post-developmental Verbal Studies students equals the mean grade point average of regular students. ($\bar{X}_{15} = \bar{X}_{16}$)

Alternative Hypothesis: H_a $\bar{X}_{15} \neq \bar{X}_{16}$

Criterion for Decision: Reject H_o and accept H_a if $z \geq 1.96$.

TABLE 11

DATA FOR z-TEST OF SIGNIFICANCE FOR
SAMPLE GROUPS S-15 AND S-16

	S-15		S-16
$\bar{X}$	2.262		2.577
s.d.	.8800		1.1374
N	49		15,483
$\bar{X}_{15} - \bar{X}_{16}$		.315	
z-score		2.50*	

*(Significant at the 0.05 level).

Since the computed value of z exceeded the critical value of z, the null hypothesis was rejected. There was a significant difference between the mean grade point average of post-developmental Verbal Studies students and regular students over a seven-quarter period.

Hypothesis XIII. Post-developmental students who complete Verbal Studies/Reading Improvement do not perform as well as regular students in terms of grade point average over a seven-quarter period following the completion of Developmental Studies.

Descriptive Data Of S-17. Prior to Fall, 1971, each person who entered Thomas Nelson Community College was required by the Counseling Center to take the CGP test upon acceptance by the Office of Admissions and Records. If a potential student received a raw score under 45 on the sentence section and under 45 on the reading section, the student was usually required to enroll in non-credit developmental courses (i.e., Verbal Studies and Reading Improvement) and to complete both successfully before entering credit courses.

The College transcripts of 54 students* constituting S-17, were studied for a seven-quarter period to determine the number of quarter hours each student completed, the GPA's, and the grade distribution by divisions and subject areas. If a subject in S-17 completed less than seven quarters, his GPA was recorded for the last quarter in which quality points were earned.

GPA and Number of Hours Completed. The total number of hours completed and the GPA for each subject in S-17 are shown in Appendix 9 (A), page 117, and depicted by the Scattergram in Appendix 9 (B), page 118.

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*Of the total number enrolled in both developmental Verbal Studies and Reading Improvement, the permanent records of 6 out of 60 students could not be located in the Office of Admissions and Records.

Fifty-four students completed an average of 40.5 quarter hours over the seven quarters studied. The credit hours showed a range from 2 through 98; the range of GPA's was from 0.625 to 3.283. Table 12, page 52 shows that the average GPA increased from below the grade D through the grade B while, concomitantly, the average number of hours completed increased from 8.4 to 62.3. The mean GPA was 1.855.

TABLE 12

CUMULATIVE GRADE POINT AVERAGE AND NUMBER OF HOURS COMPLETED BY S-17 FOR SEVEN QUARTERS

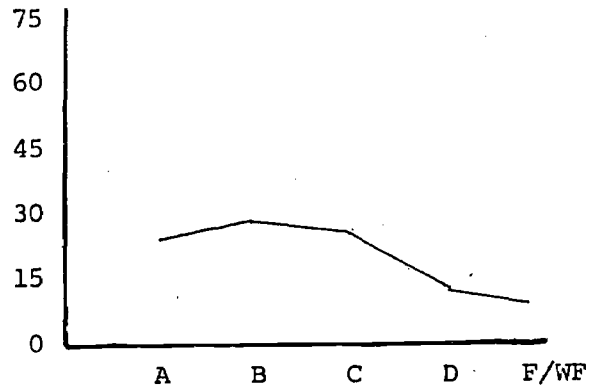
Interval GPA	No. of Students	No. of Hours Completed	Avg. No. of Hrs. Completed	Mean GPA
0.000 - 0.999	8	67	8.4	0.721
1.000 - 1.999	22	930	42.3	1.187
2.000 - 2.999	21	1,001	47.7	2.304
3.000 - 4.000	3	187	62.3	3.153
TOTALS	54	2,185	40.5	1.855

Grade Distribution By Divisions And Subject Areas. Table 13, page 54 shows the percentage distribution of grades by divisions; Figure 3, page 53 graphically presents this data; Appendix 9 (C), page 119, shows the grade distribution by the subject areas; and Appendix 9 (D), page 120, shows the divisional grade distribution by subject areas.

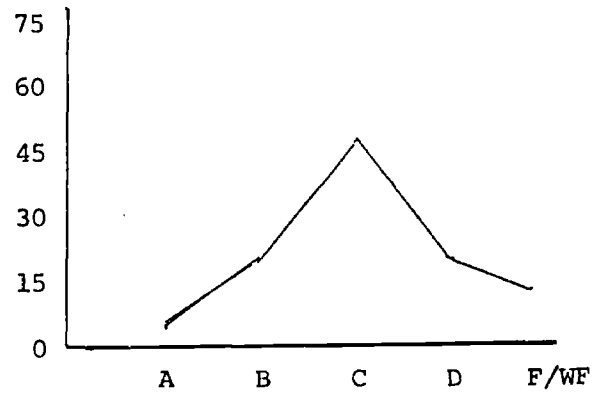
As shown in Figure 3, page 53, the Business Division had three noticeable peaks with 24 per cent A's, 29 per cent B's, and 25 per cent C's. Engineering Technologies peaked at the B level with 38 per cent. The other three divisions peaked at the C level. The distribution for

FIGURE 3

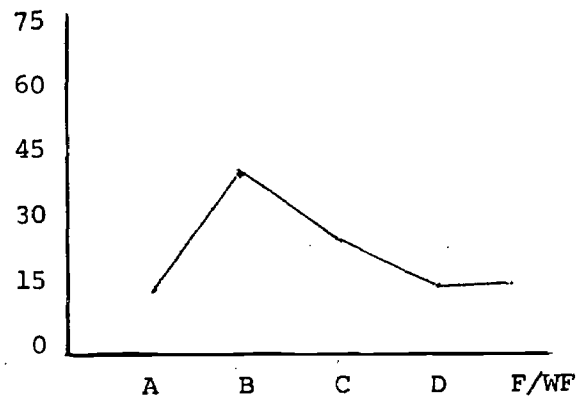
POLYGONS DEPICTING PERCENTAGE GRADE DISTRIBUTION BY DIVISIONS FOR S-17



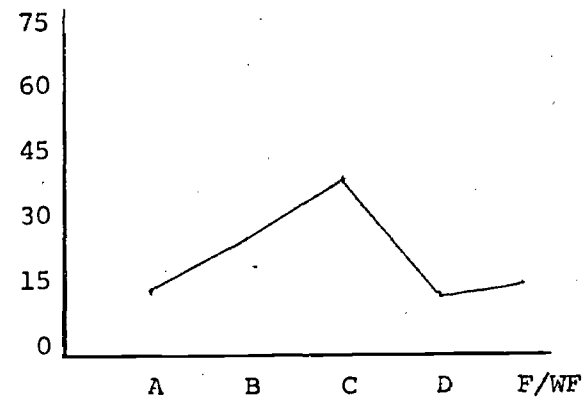
Business



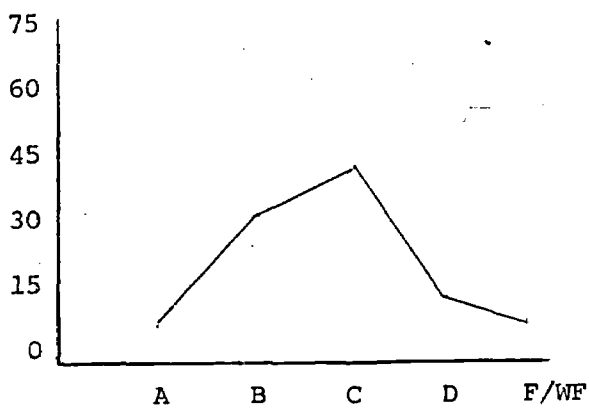
Communications and Humanities



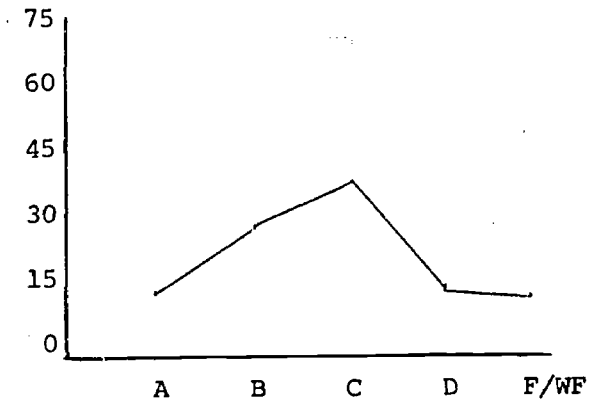
Engineering Technologies



Natural Sciences and Mathematics



Public Services



All Divisions

all five divisions showed that A's, B's, and C's constituted 75 per cent of the total grades. The highest mean GPA was 2.458 in the Business Division, and the lowest was 1.817 in the Communications and Humanities Division.

TABLE 13

PERCENTAGE DISTRIBUTION OF GRADES
BY DIVISIONS FOR S-17

Division	A	B	C	D	F/WF	Mean GPA
Business	24%	29%	25%	13%	9%	2.458
Communications and Humanities	3%	21%	45%	17%	14%	1.817
Engineering Technologies	13%	38%	23%	13%	13%	2.256
Natural Sciences and Mathematics	12%	26%	36%	12%	14%	2.102
Public Services	6%	30%	42%	13%	9%	2.126
GRADE DISTRIBUTION	13%	27%	35%	13%	12%	
DIVISIONAL MEAN						2.152
MEAN GRADE DISTRIBUTION						2.170
MEAN GPA FOR S-17						1.855

Thirty-two subject areas were completed by S-17. Less than a C average was earned in 11 subjects, which constituted 342 out of 2,185 quarter hours completed. In four subject areas, a B or higher average was earned, comprising 122 out of 2,185 quarter hours completed.

Descriptive Data Of S-18. Between Winter, 1971, and Winter, 1973, 15,478 full- and part-time students completed 119,985 quarter hours (estimating three quarter hours for each grade received) with a mean GPA of 2.577. The grade distribution of S-18 appears in Table 14 page 55.

To compare the GPA's of S-17 with S-18 the grade distribution for all students was tabulated for seven quarters. When the grade distribution of the subjects in S-17 was subtracted from those of the total student body, the grade distribution for S-18 was calculated.

TABLE 14

GRADE DISTRIBUTION OVER SEVEN QUARTERS
FOR SAMPLE GROUPS S-17 AND S-18

	A	B	C	D	F/WF	Total
Total Population	9,627	13,287	11,467	3,605	2,858	40,844
S-17	- 113	- 229	- 294	- 115	- 98	- 849
S-18	9,514	13,058	11,173	3,490	2,760	39,995

z-Test Of Significance For S-17 And S-18. To determine if the relationship between the mean grade distribution of S-17 and S-18 differed significantly, a z-test of significance was calculated to establish if the difference in the two sample means could be accounted for by chance variables. The results were as follows:

Null Hypothesis: H_o The mean grade point average of post-developmental Verbal Studies/Reading Improvement students equals the mean grade point average of regular students. ($\bar{X}_{17} = \bar{X}_{18}$)

Alternative Hypothesis: H_a $\bar{X}_{17} \neq \bar{X}_{18}$

Criterion for Reference: Reject H_o and accept H_a if $z \geq 1.96$.

Since the computed value of z was greater than the critical value of z, the null hypothesis was rejected. There was a significant difference between the mean GPA of post-developmental Verbal Studies/Reading Improvement students and regular students over a seven-quarter period.

TABLE 15

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-17 AND S-18

	S-17		S-18
$\bar{X}$	1.855		2.580
s.d.	.7373		1.1374
N	54		15,478
$\bar{X}_{17} - \bar{X}_{18}$		.725	
z-score		7.75*	

*(Significant at the 0.05 level).

Hypothesis XIV. Post-developmental Verbal Studies students do perform better in terms of grade point average over a seven-quarter period than students with low Comparative Guidance and Placement Test scores who do not enroll in developmental Verbal Studies.

Descriptive Data Of S-15. The data concerning post-developmental Verbal Studies students (S-15) were described in Hypothesis XI, pages 46-47.

Descriptive Data of S-19. Prior to Fall, 1971, each person who entered Thomas Nelson Community College was required by the Counseling Center to take the CGP test upon acceptance of student status by the Office of Admissions and Records. The sentence section measured the level of competence of English verbal skills. If a potential student received a raw score under 45, the student was usually required to take a non-credit developmental course in Verbal Studies and to complete it successfully before enrolling in a credit English class. If a student scored below 45 on the sentence section but made a C or better grade

average in high school, the student was allowed to enter directly into a credit English class. Between Winter, 1971, and Spring, 1972, 62 students scored below 45 on the sentence section of the CGP and enrolled directly in a credit English class without taking developmental Verbal Studies. This group constituted S-19.

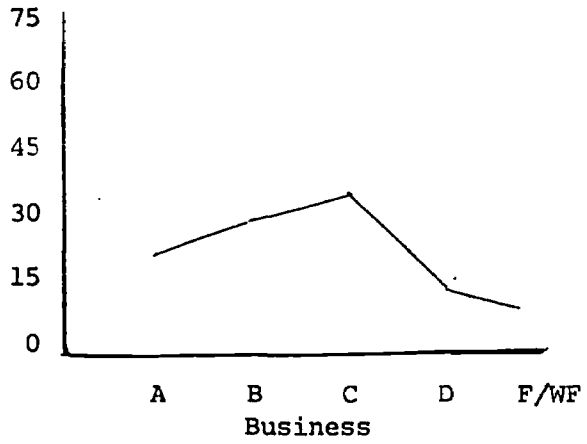
The College transcripts of S-19 were studied for a seven-quarter period to establish the number of quarter hours each student completed, the GPA's, and the grade distribution by divisions and subject areas. If a student in S-19 completed less than seven quarters, his GPA was recorded for the last quarter in which quality points were earned.

GPA and Number of Hours Completed. Sixty-two students completed an average of 40.4 quarter hours over the seven quarters studied. The credit hours showed a range from 3 through 100; the range of GPA's was from 0.360 through 3.227, as shown in Appendix 10 (A), page 122, and depicted by the Scattergram in Appendix 10 (B), page 123. Table 16, page 59, shows that the average GPA increased from below the grade D through the grade B while, concomitantly, the average number of hours completed increased from 10.6 through 57.2. The mean GPA was 1.875.

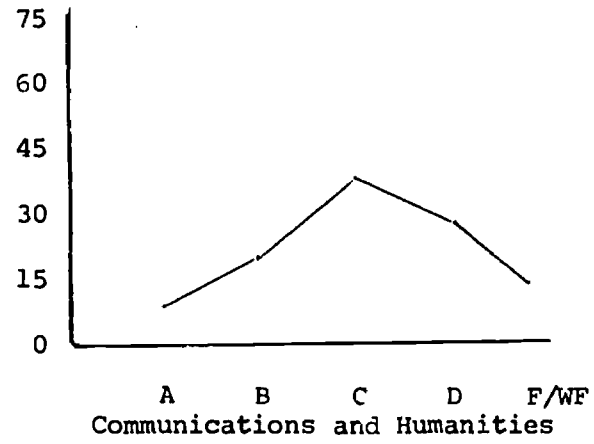
Grade Distribution by Divisions And Subject Areas. Table 17, page 59, shows the percentage distribution of grades by divisions; Figure 4, page 58, graphically presents this data; Appendix 10 (C), page 124, shows the grade distribution by subject areas; and Appendix 10 (D), page 125, shows the divisional grade distribution by subject areas. As shown in Figure 4, page 58, all five divisions had the highest percentage of grades at the C level with an average of 34 per cent; B's and D's represented 26 per cent and 18 per cent respectively; A's and

FIGURE 4

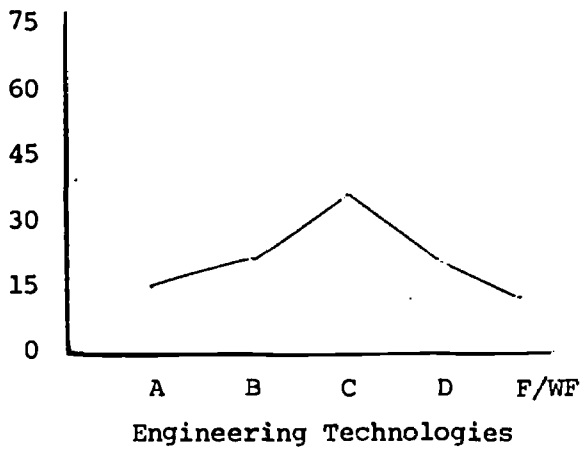
POLYGONS DEPICTINC PERCENTAGE GRADE
DISTRIBUTION BY DIVISIONS FOR S-19



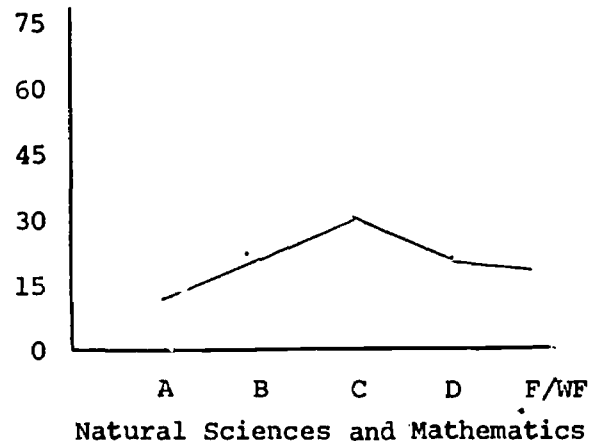
Business



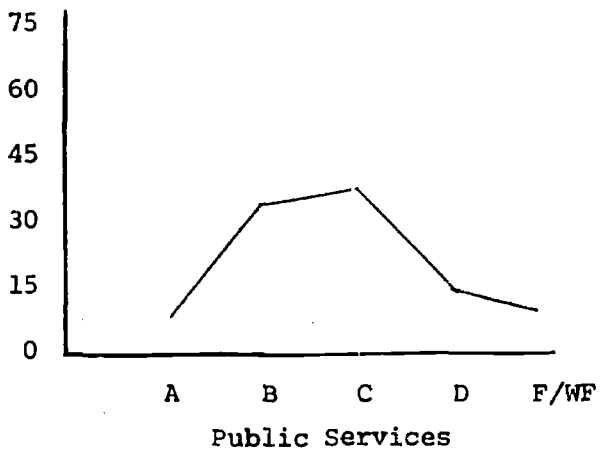
Communications and Humanities



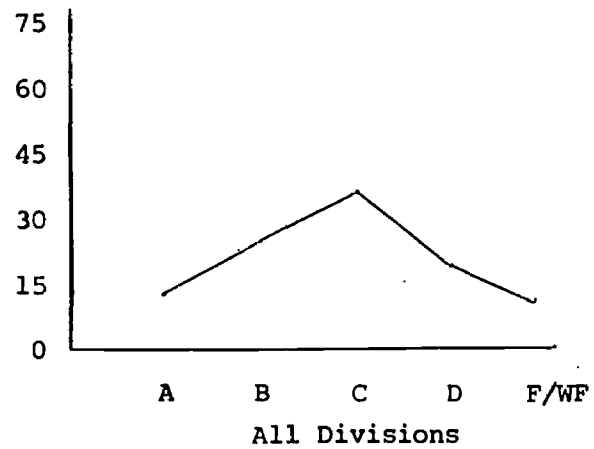
Engineering Technologies



Natural Sciences and Mathematics



Public Services



All Divisions

TABLE 16

CUMULATIVE GRADE POINT AVERAGE AND NUMBER
OF HOURS COMPLETED BY S-19 FOR SEVEN QUARTERS

Interval GPA	No. of Students	No. of Hours Completed	Avg. No. of Hrs. Completed	Mean GPA
0.000 - 1.999	9	96	10.6	0.748
1.000 - 1.999	25	856	34.2	1.552
2.000 - 2.999	23	1,267	55.1	2.399
3.000 - 4.000	5	286	57.2	3.109
TOTALS	62	2,505	40.4	1.875

F's represented 12 per cent and 10 per cent respectively. The Business Division had the highest mean GPA with 2.386 and the Communications and Humanities Division had the lowest with 1.705.

In 11 out of 31 subject areas completed, or 405 out of 2,505 quarter hours, less than a C average GPA was earned; mathematics and English together constituted 53 per cent of this total. In only four subject areas was a B or better GPA earned, totaling 29 out of 2,505 quarter hours completed.

TABLE 17

PERCENTAGE DISTRIBUTION OF GRADES
BY DIVISIONS FOR S-19

Division	A	B	C	D	F/WF	Mean GPA
Business	19%	29%	32%	13%	7%	2.386
Communications and Humanities	2%	19%	39%	28%	12%	1.705
Engineering Technologies	14%	20%	35%	20%	11%	2.000
Natural Sciences and Mathematics	11%	21%	30%	21%	17%	1.850
Public Services	7%	33%	39%	13%	8%	2.174
GRADE DISTRIBUTION	12%	26%	34%	18%	10%	
DIVISIONAL MEAN						2.023
MEAN GRADE DISTRIBUTION						2.112
MEAN GPA FOR S-19						1.875

z-Test Of Significance For S-15 And S-19. To determine if the relationship between the mean grade distribution of S-15 and S-19 differed significantly, a z-test of significance was calculated in order to establish if the difference between the two sample means could be accounted for by chance variables. The results were as follows:

Null Hypothesis: H_o The mean grade point average of post-developmental Verbal Studies students equals the mean grade point average of students scoring low in verbal skills on the CGP. ($\bar{X}_{15} = \bar{X}_{19}$)

Alternative Hypothesis: H_a $\bar{X}_{15} \neq \bar{X}_{19}$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

TABLE 18

DATA FOR z-TEST OF SIGNIFICANCE FOR SAMPLE GROUPS S-15 AND S-19

	S-15		S-19
$\bar{X}$	2.262		1.875
s.d.	.880		1.122
N	62		49
$\bar{X}_{15} - \bar{X}_{19}$		.387	
z-score		2.037*	

*(Significant at the 0.05 level).

Since the computed value of z exceeded the critical value of z, the null hypothesis was rejected. There was a significant difference between the mean GPA's of the two groups scoring below 45 on the sentence section of the CGP. The group which completed Verbal Studies prior to enrolling in credit courses had higher GPA's than the students

who scored low on the sentence section and did not enroll in Verbal Studies before enrolling in credit classes.

Hypothesis XV. Post-developmental Verbal Studies students do perform better in terms of grade point average over a seven-quarter period than they do for the quarter following the completion of Developmental Studies.

Descriptive Data For S-5. Descriptive data for S-5 was previously detailed on pages 38, and 40-41.

Descriptive Data For S-15. Descriptive data for S-15 was previously detailed on pages 46-47.

z-Test Of Significance For S-5 And S-15. To determine if the relationship between the mean grade distribution of S-5 and S-15 differed significantly and to establish if the difference between the two sample means could be accounted for by chance variables, a z-test of significance was calculated. The results were as follows:

Null Hypothesis: H_o — The mean grade point average of post-developmental Verbal Studies students over a seven-quarter period equals the mean grade point average of post-developmental Verbal Studies students for the quarter following the completion of Developmental Studies. ($\bar{X}_5 = \bar{X}_{15}$)

Alternative Hypothesis: H_a — $\bar{X}_5 \neq \bar{X}_{15}$

Criterion for Decision: Reject H_o and accept H_a if $z > 1.96$.

Since the computed value of z did not exceed the critical value of z, the null hypothesis was accepted. There was not a significant difference between the mean GPA of post-developmental Verbal Studies students over a seven-quarter period and the mean GPA of post-developmental Verbal Studies students for the quarter following the completion of Developmental Studies.

TABLE 19

DATA FOR z-TEST OF SIGNIFICANCE FOR
SAMPLE GROUPS S-5 AND S-15

	S-5		S-15
$\bar{X}$	2.015		2.262
s.d.	1.043		.8800
N	43		49
$\bar{X}_5 - \bar{X}_{15}$		0.247	
z-score		1.760*	

*(Not significant at the 0.05 level).

SECTION X

ANALYSIS OF DATA

This section of the study analyzed the performance of post-developmental students in beginning credit English and mathematics courses during Fall Quarter, 1972. The mean grade and GPA were compared with that of the regular students in the same courses.

Analysis of S-1 and S-2. The 26 post-developmental students (S-1) examined did not perform as well as the 218 regular students (S-2) in terms of mean grade in English 101. The mean grade for S-1 was 1.78 while the mean grade for S-2 was 2.53. It should be noted that the percentage of unsatisfactory performance (D and F) among S-1 in English 101 was 42 per cent while the percentage among S-2 in the same course was 11 per cent.

Analysis of S-3 and S-4. The 20 post-developmental students (S-3) performed as well as the 262 regular students (S-4) in English 111. The mean grade for S-3 was 2.1 while the mean grade for S-4 was 2.25. It should be noted that the percentage of unsatisfactory performance (D and F) among S-3 in English 111 was 25 per cent while the percentage among S-4 in the same course was 19 per cent.

Analysis of S-5 and S-6. The 43 post-developmental students (S-5) were the combined total of S-1 and S-3. The 480 regular students enrolled in English 101 and 111 in Fall Quarter, 1972, constituted S-6. The GPA of S-5 was 2.015 while the GPA of regular students was 2.532. It should be noted that the percentage of unsatisfactory GPA (below 2.000) among S-5 in terms of grade point average was 47 per cent while the percentage among S-6 was 21 per cent.

Summary. It appeared that S-3 performed well (2.1) in English 111, a course required for the four-year degree, while S-1 did not perform well (1.78) in English 101, a course required for the two-year technical-occupational degree. It should be noted that the GPA of S-5 (2.015) fell above the critical level of satisfactory performance (2.000).

Analysis of S-7 and S-8. The 29 post-developmental students (S-7) did not perform as well as the 104 regular students (S-8) in terms of mean grade in Mathematics 151. The mean grade for S-7 was 2.069 while the mean grade for S-8 was 2.587. It should be noted that the percentage of unsatisfactory performance (D and F) among S-7 in Mathematics 151 was 31 per cent while the percentage among S-8 in the same course was 13 per cent.

Analysis for S-9 and S-10. The 17 post-developmental students (S-9) did not perform as well as the 36 regular students (S-10) in Mathematics 161. The mean grade for S-9 was 1.47 while the mean grade for S-10 was 2.44. It should be noted that the percentage of unsatisfactory performance (D and F) in Mathematics 161 was 52 per cent while the percentage among S-10 was 22 per cent in the same course.

Analysis of S-11 and S-12. The 32 post-developmental students (S-11) performed as well as the 61 regular students (S-12) in Mathematics 181. The mean grade of S-11 was 2.531 while the mean grade of S-12 was 2.852. It should be noted that the percentage of unsatisfactory performance (D and F) among S-11 in Mathematics 181 was 13 per cent while the percentage among S-12 in the same course was 21 per cent.

Analysis of S-13 and S-14. The 78 post-developmental students (S-13) were the combined total of S-7, S-9, and S-11. The 201 regular students enrolled in Mathematics 151, Mathematics 161, and Mathematics 181 in Fall Quarter, 1972, constituted S-14. The GPA of S-13 was 2.295 while the GPA

of regular students was 2.776. It should be noted that the percentage of unsatisfactory GPA's (below 2.000) among S-13 was 32 per cent while the percentage among S-14 was 13 per cent.

Summary. It appeared that S-7 and S-11 performed well (2.069 in Mathematics 151 and 2.531 in Mathematics 181) but that S-9 did not perform well (1.47) in Mathematics 161. Mathematics 151 is a course required for the two-year technical-occupational degree, and Mathematics 161 and Mathematics 181 are courses required for the four-year degree. It should be noted that the GPA of S-13 (2.295) exceeded the critical level of satisfactory performance (2.000).

The data resulting from Hypotheses XI, XIII, XIV, and XV* were analyzed by the three sample groups, S-15, S-17, and S-19, and by the results found in the subject areas completed in the five divisions. (See Appendix 14, page 130; Appendix 15, page 131; and Appendix 16, page 132).

Analysis of S-15. The 49 students in S-15, who enrolled in and completed Verbal Studies before enrolling in credit courses, completed an average of 39.8 quarter hours and usually dropped out of Thomas Nelson Community College before the end of the seven-quarter period studied. The median number of quarter hours completed was 26, less than two full quarters and fewer hours than S-17 or S-19 completed. The ten students with the lowest GPA's completed 8 per cent of all courses taken while the ten students with the highest GPA's completed 26 per cent of all courses taken. Based on this data, one possible conclusion drawn was that the number of hours completed was a function of a student's grade performance.

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*The population of S-5 was analyzed on page 38.

The mean of all subject grades received in S-15 was 2.563, the highest of S-15, S-17, and S-19. The mean GPA of all 49 students was 2.262. A greater amount of success seemed to be evidenced when verbal skills were not necessarily a correlate of reading skills since the S-17 sample earned the lowest GPA of all three groups. This finding would agree with Schneyer (1963), who found that if students were deficient in verbal skills only, they improved greatly in their GPA following the completion of remedial courses.

Courses taken in the Business and the Communications and Humanities Divisions constituted 55 per cent of all courses completed by S-15. The second highest divisional GPA was earned in the Business Division (2.687) and the lowest earned was in the Communications and Humanities Division (2.178). These data agreed with the studies of Lloyd (1969) and Pollock (1970). The highest mean in English of S-15, S-17, and S-19 was achieved by S-15 with 2.247, which was similar to the mean in English (2.278) of all regular students* and was consistent with the mean GPA of S-15, 2.262.

The Natural Sciences and Mathematics Division received the third largest number of enrollees with 19 per cent and earned the third ranked GPA with a 2.586. Twenty-six per cent of the courses taken were in the Public Services and Engineering Technologies Divisions. The highest divisional GPA of S-15, was in Engineering Technologies (3.268), and the fourth ranked GPA of 2.470 was in Public Services. Even though 2.470 was the fourth ranked GPA for S-15, it was higher than any divisional GPA for S-17, and S-19. In only 4 out of 31 subject

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*GPA records were available for English for 5 of the 7 quarters studied (See Appendix 13, page 129).

areas taken was a D or F earned while in 9 out of 31 subjects a B or better grade was received.

The z-test of significance yielded a significant difference between the means of S-15 and S-16. In terms of performance measured by grades earned in credit classes, the students who completed Verbal Studies before enrolling in credit classes averaged a 0.315 mean GPA points below the regular students. It appeared that the courses taken in Developmental Studies did aid the students to perform on a higher level than S-17 and S-19 students but on a lower level than regular students not needing Developmental Studies prior to entry in credit classes. However, the mean GPA of 2.262 and the mean English GPA (2.247) of S-15 seemed to indicate that the deficiency noted before entering Thomas Nelson Community College was corrected to an acceptable and passing performance level.

Analysis of S-17. Fifty-four students (S-17) enrolled in and completed Developmental Verbal Studies and Reading Improvement before enrolling in credit courses. During the academic year, Fall, 1970, to Spring, 1971, eight students enrolled in Reading Improvement only. The overwhelming majority of students at Thomas Nelson Community College who scored low on the reading section of the CGP also scored low on the sentence section. This finding agreed with the research of Strang (1943), who felt that verbal scores on standardized tests were often a function of reading. The studies of McClellan (1970), Halfter and Hadley (McClellan, 1970) reported that a little less than two-thirds of community college students across the nation were reading below their grade level while the Bronx Community College reported their figure to be 70 per cent (New York Times Magazine, May 27, 1973). Since a student

at Thomas Nelson Community College may read below level 13 and yet not score low enough on the CGP to be placed in developmental courses, it was impossible to establish a common basis for comparison with reported research.

An average of 40.5 quarter hours was completed by S-17. The median number of quarter hours completed was 39, which was ten hours less than a full year's credit course load and one-third greater than S-15. The ten students with the lowest GPA's completed 6 per cent of all courses taken while the ten students with the highest GPA's completed 32 per cent of the courses taken. The number of hours completed seemed to be a function of the student's performance level, as it was for S-15.

The mean of all subject grades received in S-17 was 2.170, the lowest of all three sample groups. The mean GPA of all 49 students was 1.855. When students were deficient in both verbal and reading skills on the CGP, the mean GPA was lower than if the deficiency was in verbal skills alone and lower than S-19, who had deficiencies and took credit courses without first taking Developmental Studies. This finding disagreed with Sawyer (1969) and Couch (1969) who found the student's GPA increased after developmental work but agreed with Losak's (1968) study at Miami-Dade Community College.

Courses taken in the Business Division and the Communications and Humanities Division constituted 55 per cent of all courses completed by S-17. The highest divisional GPA was earned in the Business Division (2.458), and the lowest GPA was in the Communications and Humanities Division (1.817). These findings were similar to those of S-19 and in accordance with the studies of Lloyd (1969) and Pollock (1970). The

Natural Sciences and Mathematics Division received the second largest number of enrollees with 23 per cent and earned tne fourth ranked divisional GPA with a 2.102. Twenty-one per cent of the courses taken were in the Public Services and Engineering Technologies Divisions with the second highest divisional GPA of 2.256 in Engineering Technologies and the third ranked GPA of 2.126 in Public Services.

When a z-test of significance was calculated between the mean GPA of S-17 and S-18, there was a significant difference between the two sample groups. In terms of performance measured by grades earned in credit classes, the students who completed Verbal Studies/Reading Improvement before enrolling in credit classes averaged 0.725 mean GPA points below the regular students. It appeared that students who needed courses in both Verbal Studies/Reading Improvement and who enrolled in and completed these courses at a competency level established by the instructors were still unable to match the performance of regular students or those students who needed only Verbal Studies, or S-19. The mean GPA was 1.855, slightly below a C level of performance and slightly below the 1.875 mean GPA of S-19. The question was thus raised as to the adequacy of the performance level established by the Verbal Studies and Reading Instructors or perhaps as to the transferability of those recently learned skills to various areas of study.

The performance of S-17 in credit English classes over a seven-quarter period showed a GPA of 1.745, which, although it was higher than S-19 (1.646), it was lower than that for S-15 (2.247) and of all regular English students (2.278). It appeared that the students completing the Developmental Studies program in Verbal Studies/Reading Improvement were not able to complete successfully credit English courses on a C or

better level, nor were they able to complete successfully 11 out of 32 subject areas attempted. In only 4 out of 32 subjects taken was a B or better grade received.

Analysis of S-19. The 62 low CGP students, studied as S-19, completed an average of 40.4 quarter hours over a seven-quarter period with very few students still attending Thomas Nelson Community College at the end of this study. Forty quarter hours, however, was similar to that completed by S-15 and S-17. The median number of quarter hours completed was 34, which was the equivalent of two full-time quarters. This finding disagreed with Tokheim (1968), Couch (1969), Sawyer (1969), and the City Colleges of Chicago, but it did concur with the results of Pearce's (1968) study at San Mateo College, in which no significant differences were found in attrition rates between a control group and an experimental group enrolled in developmental programs.

The ten students with the lowest GPA's in S-19 completed 3 per cent of all courses taken while the ten students with the highest GPA's completed 34 per cent of all courses taken. The number of hours completed seemed to be a function of the student's GPA. The mean of all subject grades received by S-19 (2.112) was slightly higher than the national mean of 1.99 for all junior and community college students but considerably lower than the mean GPA of Thomas Nelson Community College's post-developmental Verbal Studies students (2.262) or of regular students (2.577). The mean GPA of all 62 students was 1.875. Since S-17 and S-19 had similar mean GPA's (1.855 and 1.875 respectively) the question must be asked as to the effectiveness, in terms of grades earned in credit courses, of the Developmental Studies program for students enrolled in both Verbal Studies/Reading Improvement.

Sixty-two per cent of all courses taken by S-19 were in the Business Division and Communications and Humanities Division, with the highest divisional GPA earned in the Business Division (2.386) and the lowest GPA earned in the Communications and Humanities Division (1.705). This finding regarding the Business Division agrees with Lloyd (1969) who found that underachievers primarily enter business programs.

The third ranked percentage of courses taken was 18 per cent in the Natural Sciences and Mathematics Division with the fourth ranked GPA of 1.850. Twenty per cent of the courses taken were in the Public Services and Engineering Technologies Divisions with the second highest GPA of 2.174 in the Public Services Division and the third ranked GPA of 2.000 in the Engineering Technologies Division. In only four out of 31 courses did S-19 earn a GPA of a B or higher while in 9 out of 31 courses, a D or F was received.

When a z-test was calculated between S-15 and S-19, there was a significant difference between the mean GPA of the two groups. In terms of performance measured by grades earned in credit classes, the students who completed Verbal Studies before enrolling in credit classes averaged 0.387 mean GPA points above the low CGP group. It would appear that the courses taken in Developmental Studies did aid the post-developmental student in Verbal Studies in achieving a higher level of performance both in English credit courses and in all other subject areas completed. However, Developmental Studies did not appear to aid the post-developmental Verbal Studies/Reading Improvement student to achieve a higher level of performance than that of the low CGP student.

Analysis of S-5 and S-15. The analysis of data for S-5 and S-15 sample groups was previously described on pp. 38 and 46. When a z-test

was calculated, there was no significant difference between the mean GPA of S-5 and S-15.

Analysis by Divisions and Subject Areas. To establish the relationship of the Developmental Studies Division to the total educational program of Thomas Nelson Community College, it was relevant to focus on those subject areas and divisions in which post-developmental students and low CGP students were able to perform the class requirements and to examine the level of their achievement.

Forty-nine per cent of all courses taken by S-15, S-17, and S-19 were in five subject areas (English, mathematics, history, physical education, and psychology), with the highest grades earned of all subject areas in physical education, economics, psychology, business administration, and history. A breakdown by divisions and courses taken over a seven-quarter period follows.

Business Division. All three sample populations took the largest percentage of credit courses (37 per cent) in this division. Of all five divisions, S-15 showed the second highest GPA (2.687), and S-17 and S-19 earned their highest GPA (2.458 and @.386 respectively) in this division. The divisional GPA earned by all three samples was 2.482. The highest grades earned were in marketing, and the lowest, in data processing, with the largest number of enrollees in history, physical education, and business administration. Thirty-seven per cent of all credit classes taken by the three sample groups and thirty-six per cent of all credit classes taken by regular students were in this division.

Communications and Humanities Division. All three sample populations took the second largest percentage of credit courses (21 per cent) in this division. Twenty-one per cent was comparable t the

percentage age of regular students who took approximately 20 per cent of all their courses in this division. The lowest earned GPA of all five divisions was shown in this division, with S-17 a 1.817; S-19 a 1.705; and S-15 a 2.178. The divisional GPA earned by all three samples was 1.886. Seventy per cent of all subjects taken in this division were in English, with the highest grades earned in Radio/Television and the lowest in Speech/Drama.

Engineering Technologies Division. All three sample populations took the lowest percentage of credit courses (6 per cent) in the Engineering Technologies Division. Six per cent was comparable to regular students who took approximately 7 per cent of all their courses in this division. The highest GPA for S-15 (3.268), the second highest for S-17 (2.256), and the third highest for S-19 (2.000) were earned in this division. The divisional GPA earned by all three samples was 2.558. The highest grades and the lowest enrollment were in mechanical technology, with the largest number of enrollees in engineering and the lowest grades in drafting.

Natural Sciences and Mathematics Division. The third ranked percentage of credit courses taken by S-15 and S-19 and the second ranked percentage of credit courses taken by S-17 were in this division. The overall percentage (20 per cent) of courses taken by S-15, S-17, and S-19 was 6 per cent more than that taken by regular students. The fourth ranked GPA for S-19 (1.850), S-17 (2.102), and S-15 (2.470) were earned in this division. The divisional GPA earned by all three samples was 2.146. The highest grades recorded were in geography, and the lowest in biology, with the largest number of students enrolled in mathematics and biology.

Public Services Division. The fourth ranked percentage of credit courses taken by all three sample populations (16 per cent) was in this division. Sixteen per cent was seven per cent lower than the courses enrolled in by regular students. The second highest GPA (2.174) for S-19, the third ranked GPA for S-17 (2.126), and the fourth ranked GPA for S-15 (2.470), were earned in this division. The divisional GPA earned by all three samples was 2.245. Psychology and sociology had the largest number of enrollees, with the highest grades given in law enforcement.

SECTION XI

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary. Thomas Nelson Community College is an open-door community college in Hampton, Virginia. The open-door policy allows many students to enter the college without the preparation required to meet the academic demands of the various curricula offered. The Developmental Studies Division of the College has the responsibility of providing an opportunity for these inadequately prepared students to obtain the necessary knowledge and basic skills for entry into an associate degree program.

This study was an attempt to determine if those students who complete the objectives of the developmental courses required can successfully compete with regular students in beginning credit English courses, mathematics courses, and in grade point average.

A survey of the related literature indicated that many open-door community colleges throughout the nation have also attempted to evaluate the effectiveness of their developmental programs. For the most part, the literature indicated that the majority of developmental programs which have been researched have not been successful for various reasons.

An analysis of the data accumulated for post-developmental students at Thomas Nelson Community College revealed that S-3, S-5, S-7, S-11 and S-15 did perform well (over the acceptable level of 2.000). However, S-1 and S-9 did not perform at the acceptable 2.000 level.

Students who scored low on the CGP test in verbal skills and who did not enroll in Developmental Studies (S-19) did not seem to perform at a satisfactory level in credit courses. Students who scored low on the CGP test in both verbal skills and reading (S-17) seemed to perform unsatisfactorily in most credit courses after completing Developmental Studies. The standards set for students in the Developmental Studies program did not appear to be academically sufficient to meet the standards of the instructors teaching credit courses. A mean GPA for S-17 of 1.855 and for S-19 of 1.875 would result in academic warning and subsequently, probable academic probation or suspension.

Those students who scored low on only the verbal skills section of the CGP and who enrolled in Developmental Studies (S-15) were able to complete credit courses satisfactorily after successfully completing developmental Verbal Studies. Their overall mean GPA of 2.262 and their mean GPA in English of 2.247, compared with the mean GPA of S-17 (1.855), seemed to indicate that if a student were deficient only in verbal skills, the possibility of reaching a satisfactory level of performance in credit courses was greater than if he were deficient in both verbal skills and reading.

When a z-test was calculated between the mean grade distribution of post-developmental Verbal Studies students over a seven-quarter period (S-15) and with post-developmental Verbal Studies students for the quarter following the completion of Developmental Studies (S-5), no significant difference was found.

The mean number of quarter hours completed was approximately 40 for all three sample groups. The attrition rate did not appear to be related to whether or not a student enrolled in and successfully completed Developmental Studies.

The overall pattern of enrollment of S-15, S-17 and S-19 in the five educational divisions of Thomas Nelson Community College was comparable to that of the total student body, with the exception of the Public Services Division having slightly fewer students and the Natural Sciences and Mathematics Division having slightly more students. In those subject areas with the largest enrollment, the lowest mean GPA's were found in biology, English, and mathematics while the highest mean GPA's were in physical education, economics, psychology, history and business administration. It was noted that English, mathematics, and history had the largest enrollments of all subject areas, totaling 825 out of 2,408 courses completed over a seven-quarter period.

Conclusions. The concern to meet the needs of an increasing number of academically deficient students is growing among two-year educational institutions across the nation. The areas of critical deficiency have been isolated as English, mathematics, and reading. After the necessity of developmental programs has been firmly established, basic questions concerning the proper selection and exact placement of students, the objectives and methodology of developmental courses, and the evaluation of student learning present themselves in bewildering numbers. A plethora of research has indicated that when developmental

programs have been estimated and later evaluated, most institutions studied have recorded contradictory results. Additionally, their programs were often found to be based on unproved assumptions, resulting in unfulfilled objectives. These findings, because of their ambiguity, inevitably lead to the need for clarification through additional, more detailed institutional research.

An evaluation of the learning of post-developmental students at Thomas Nelson Community College, based on grades received in credit courses and grade point averages, yielded similarly varied and seemingly contradictory findings and pointed out the need for further research. While these findings indicated that post-developmental students succeeded in some initial English and mathematics credit courses but not in others, or in some subject areas but not in others, further research seemed imperative with an endless list of areas to be researched.

The following conclusions are the result of the immediate research data:

A. The developmental student performed as well as the regular student in English 111 but not in English 101.

B. The developmental student performed as well as the regular student in Mathematics 181 but not in Mathematics 151 and Mathematics 161.

C. The mean GPA of post-developmental students in the two beginning credit English courses and in the three beginning credit mathematics courses was lower than the mean GPA of regular students in those same five courses.

D. The number of hours completed by a student was a function of his grade point average.

E. A greater amount of success in terms of GPA seemed to be evidenced by those students who completed Verbal Studies alone than by any other sample group studied.

F. A student who scored low on the reading section of the CGP usually also scored low on the sentence section as well.

G. The mean GPA of a student scoring low on the CGP was slightly above that of the student who completed both Verbal Studies and Reading Improvement.

H. Verbal Studies/Reading Improvement students had the lowest mean GPA of all three sample groups: the population that completed only Verbal Studies; the population that completed both Verbal Studies and Reading Improvement; and the population that scored low on the CGP and took no developmental courses at all.

Among the results found in this research report was the fact that records needed for adequate evaluation in an ex post facto study, such as this, were lacking. Therefore, it is recommended that longitudinal studies now be preplanned and scheduled for further, more complete investigations of developmental and post-developmental students.

Recommendations. The recommendations which follow are proposals to improve the performance of post-developmental students in credit courses and are posited as possible alternatives to methods and procedures now being employed at Thomas Nelson Community College. The recommendations are based upon a syntonization of the findings reported throughout this research project and the ideas and statistical findings gleaned from the review of related literature. The format will include the areas of testing, counseling, individualized programming, the relationship between the Developmental Studies Division and other divisions within the College, and recommendations for further research.

A. A detailed, specialized testing program should be administered to each potential developmental student in order to identify more adequately specific areas of need and to establish the points of deficiency where a student's instruction should begin.

1. In addition to tests administered to all students by the Counseling Center, an intelligence test should be administered to each developmental student. The results of all tests, including additional tests administered by the Developmental Studies Division, would be syntonized in an attempt to design a program which would best meet the needs of the student. Bossone (1970), Sheldon (1970), Cohen (1969), Woolf and Woolf (1957), Gibson (1965), Schell and Burns (1968), and Glaser (1965) found in their research that by the administration of a battery of tests, especially intelligence tests, the colleges could better identify those few students who might not profit from Developmental Studies. A testing program would also be an aid in identifying those students whose deficiencies, when remedied, would be able to attain success in other areas.

2. Tests in verbal skills, vocabulary, and reading should be administered to every developmental student to enable the English and reading instructors to identify specific areas of need and levels of proficiency. The CGP test is administered to every student to help identify broad areas of academic liability and proficiency. Until 1972, no tests were given to locate within these generalized areas the specific deficiencies of students in the areas of mathematics, English, and reading. Now, students identified as needing developmental work in mathematics are given two tests: the Nelson-Denny Reading Test which establishes the student's vocabulary, reading rate, and comprehension levels, as researched by Bittinger (1972), and the McGraw-Hill Mathematics Test which establishes various areas of deficiency in mathematics based on the research of Bossone (1970), Ray (1965), Glaser (1965),

Gibson (1965), and Vaughan and Puyear (1972). It is suggested that similar tests in verbal skills be administered to students in order to enable the English and reading instructors to design more pertinent programs of instruction based on the student's measured level of proficiency.

B. Counselors should be employed to work with developmental students only.

1. Counselors should be available for personal counseling. Research by Ray (1965), Small (1966), Wortham (1967), Newman (1971), and Schell and Burns (1968) has shown that low levels of performance demonstrated by the developmental student were often the result of non-academic problems which until solved, dissipate his concentration and energy. They suggested that poor academic performance might be a function of a troubled individual rather than of poor capability. The findings at San Mateo Junior College (1969) and the research of Roueche (1972) suggest that there is danger in the student viewing himself as a potential dropout or underachiever. The counselor could help the developmental student see himself as a potential productive student enrolled in credit courses and not in a negative light, as a second-class citizen awaiting citizenship papers before certain privileges and statuses are granted.

2. Counselors should be available for academic counseling.

a. The developmental student should be counseled as to the extent of his deficiencies. Although deficiencies exist, the student should be guided to realize that specific goals are attainable if he is willing to accept the level at which

he now stands and to expend the effort necessary to reach higher attainment levels, as suggested by Pearce (1968) and Bossone (1970). The counselor would want to emphasize the student's successes and strengths and to help him overcome his areas of weakness, rather than concentrate on a student's deficiencies.

b. The developmental student should be counseled to be concerned with the eventual attainment of specific objectives and not to overemphasize the scheduled time element of one, two, or three quarters. As Roueche (1968) and Forlando and Wrightstone (1956) found in their research, the time element is relative to the degree of the student's needs, his personal motivation, and the effort expended to correct his deficiencies. Learning and increased proficiency must be a function of the student's interest and pertinacity. These factors should be discussed with the student's interest primarily at the outset of his program, and the assumption should not be made that such awareness is self-evident.

c. Counselors should help the developmental student objectify what it is he is seeking to gain from enrollment in the Developmental Studies Division at Thomas Nelson Community College. If the counselor can aid a student in clarifying his goals, then he can also aid him in evaluating his progress in obtaining those objectives, as suggested by Bossone (1970).

d. If a student cannot meet the objectives of a developmental course of study, the counselor should help the student

locate other areas of endeavor in which he might prove proficient. Research by Glaser (1965) and Gibson (1969) suggested that aptitude tests might aid in locating other areas which would be within the reach of such a student. The student should not be allowed to fail with the feeling that he has no future potential, but he should be guided into other avenues of possible interest and achievement which he could pursue in lieu of his former academic goals.

e. The counselor should advise the student completing his developmental course of study in the selection of areas of further study. The counselor would be aware of the various levels of proficiency of the student and could relate this knowledge to the student's vocational interests in counseling him into his future course of study. The counselor could relate to the student the requisites of various subject areas and divisions and the reading levels of tests used in specific courses, thus advising him as to those areas in which he would most likely succeed.

C. The instructor should design an individualized program of study for each developmental student.

1. Daily objectives and course objectives should be given to the student in writing at the outset of his program. The student should be shown the final objectives he is expected to achieve for mastery of the course, as well as the daily objectives that will gradually guide him in reaching his ultimate goals, as suggested by Stevenson (1970) and Hoffman (Fitzgerald, 1972). Purdy (1971) showed the necessity not only to write daily objectives to be given to the student but also to include exercises

which must be completed in order to reach that daily goal and a self-test to be administered that same day to measure his progress. If these requirements and objectives were available at the beginning of his course of study, the student could progress at his own rate of speed, as suggested by Gagné (1965), Vaughan and Puyear (1972), and Roberts (1969), without waiting for the next day's assignments. When one set of objectives is mastered, the student could begin on the next set.

2. The developmental student's course of study should be flexible and amenable to change when evaluation indicates that change is needed in order to meet the needs of the student. Ray (1965) states that longitudinal studies have shown that developmental programs are usually initiated by structuring courses of study to meet the need of the students. However, once a program has been operational for several quarters and if successive evaluation has shown effective learning to have taken place, there is a danger in the course of study becoming fixed on the basis of such measured success. If this academic stifling occurs, the principle of designing a program to meet a student's needs becomes obsolete, and the student must then modify his needs to meet those of the program. If the philosophy of individualized programming is to meet the changing needs of students, then the student's course of study must be flexible, or the initial intent of the program is negated.

3. Frequent periodic testing on the student's comprehension of the academic areas studied (English, and/or reading, and/or mathematics) should be a planned part of the student's individualized program.

a. When a related group of daily objectives has been completed, an examination should be administered to determine whether further review is needed or whether the student is ready to progress to another plateau, as suggested by Hoffman (Fitzgerald, 1972). A constant evaluation of the student's progress should aid the instructor in knowing if a student's individualized program is meeting his current needs.

b. When all of the objectives of a student's individualized course of study have been completed, a comprehensive test should be administered to the student. The self-confidence of the student should be enhanced if he achieves well, and the instructor would have a measure of the degree to which the student was able to retain his learnings. Achievement of demonstrable objectives might also aid instructors in credit courses in being more receptive to post-developmental students, knowing the level of proficiency that was attained at the end of their program.

D. A philosophy of responsible cooperation should be established between the Developmental Studies Division and the other five divisions at Thomas Nelson Community College.

1. The developmental faculty teaching Verbal Studies should enlist the cooperation of the English faculty in establishing the necessary levels of proficiency to be required of the developmental student before he is permitted to enroll in English credit classes. Specific measurable objectives should be established. If these standards are met, the student should be assured that his chances of meeting the requirements of an English credit course

satisfactorily are as great as those of any student entering Thomas Nelson Community College who did not have these initial academic deficiencies.

2. The Business Division, the Engineering Technologies Division, the Natural Sciences and Mathematics Division, and the Public Services Technologies Division should establish objective standards of performance required by each division in order for prospective students to be adequately prepared in their subject areas. These standards, in turn, should be incorporated into the programming for developmental students who plan to enter certain divisions upon completion of their developmental work. This objectification would also aid the four divisions in being less hesitant in admitting post-developmental students to their curricula, knowing that the standards have been established and that the student has demonstrated his competence in meeting those standards.

3. A special orientation session should be established for the post-developmental students who plan to enter the various programs of the College's five divisions the following quarter. Each division could acquaint the prospective student with the subject areas in their divisions, the types of requirements usually made of students, the reading level of the texts used, and other pertinent information. This foreknowledge would aid the post-developmental students to select more wisely a divisional area and to schedule the subjects to be taken within that area.

E. Future developmental faculty should be as well versed in psychology, testing and measurements, and counseling, as in a

specific subject area of specialization. The need for instructors who are trained in teaching developmental studies, as researched by Wortham (1967) Richardson and Elsner (1965), is assumed to be self-evident. However, this concept is not now felt to be important at Thomas Nelson Community College. A developmental student with a past record of underachievement needs to be treated with special sensitivity and a conscious desire to improve his self-concept as well as his academic weaknesses. A resulting, more worthwhile self-image would then develop from a student's objectives, academic achievements and a strongly positive student-teacher relationship.

F. The State Board of Community Colleges should reevaluate the funds allocated for developmental programs. Factors to be reviewed for consideration would include the teacher-student ratio needed to adequately meet the needs of students, the hardware necessary to afford various modes of instruction, and the space necessary to accommodate an individualized approach to learning. Perhaps the expenditures for the developmental student are more comparable to those of the vocational student than they are to those of the regular student.

G. Institutional research should be initiated to investigate further the findings of this research project.

1. Research should be initiated to evaluate why students completing both Verbal Studies and Reading Improvement did not succeed in credit courses. Research is especially needed in light of the finding of this research project that students completing only Verbal Studies were successful in completing credit courses. If, as Bloom (1968) indicated, 90 per cent of students are capable of learning the necessary skills to succeed

in credit courses, then the programming for these developmental students should be evaluated to determine possible causative factors for the low levels of performance of post-developmental Verbal Studies and Reading Improvement students.

2. Research should be initiated to evaluate why post-developmental Verbal Studies students succeed in English 111 but do not succeed in English 101.

3. Research should be initiated to evaluate why post-developmental mathematics students succeed in Mathematics 151 and Mathematics 181 but do not succeed in Mathematics 161.

4. Research should be initiated to evaluate why students scoring low on the CGP test and not enrolling in Developmental Studies do as well in credit courses as those students scoring low on the CGP test and completing developmental Verbal Studies and Reading Improvement before entering credit courses.

5. Research should be initiated to establish if there is a sequence of credit courses which would help students build upon recently acquired skills of Developmental Studies. Small (1966) suggested the possibility that the abstract thinking of the student should be advanced at a sequential pace. As one course is often a prerequisite for another course in one particular subject area, perhaps the sequence of courses taken in various subject areas is just as sequential and significant. Gagné (1950, 1963) reported that current research is attempting to establish if such a relationship might exist.

6. Research should be initiated to establish a continual follow-up study of post-developmental students at Thomas Nelson

Community College. Areas to be considered are: the number of quarter hours attempted and completed; the grades received in each subject and the GPA; the academic record at another educational institution and his eventual vocational placement as a transfer student; and the job placement as a vocational-technical student.

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A P P E N D I X

LIST OF APPENDICES

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APPENDIX 1

GRADE DISTRIBUTION FOR S-1 AND S-2 FALL QUARTER, 1972

S-1		S-2	
Grade	f	Grade	f
A	1	A	28
B	6	B	99
C	8	C	74
D	7	D	17
F	4	F	8
TOTALS	26	TOTALS	226

$\bar{X}_1 = 1.730$ $\bar{X}_2 = 2.530$

APPENDIX 2

GRADE DISTRIBUTION FOR S-3 AND S-4 FALL QUARTER, 1972

S-3		S-4	
Grade	f	Grade	f
A	2	A	27
B	6	B	92
C	7	C	92
D	2	D	22
F	3	F	29
TOTALS	20	TOTALS	262

$\bar{X}_3 = 2.100$ $\bar{X}_4 = 2.250$

APPENDIX 3

GPA DISTRIBUTION FOR S-5 AND S-6 FALL QUARTER, 1972

S-5		S-6	
GPA	f	GPA	f
0.000 - 1.999	20	0.000 - 1.999	100
2.000 - 2.999	11	2.000 - 2.999	190
3.000 - 3.999	12	3.000 - 3.999	161
4.000 -	0	4.000 -	29
TOTALS	43	TOTALS	480

$\bar{X}_5 = 2.015$ $\bar{X}_6 = 2.532$

APPENDIX 4

GRADE DISTRIBUTION FOR S-7 AND S-8 FALL QUARTER, 1972

S-7		S-8	
Grade	f	Grade	f
A	3	A	23
B	8	B	29
C	9	C	38
D	6	D	9
F	3	F	5
TOTALS	29	TOTALS	104

$\overline{X}_7 = 2.069$ $\overline{X}_8 = 2.587$

APPENDIX 5

GRADE DISTRIBUTION FOR S-9 AND S-10 FALL QUARTER, 1972

S-9		S-10	
Grade	f	Grade	f
A	0	A	7
B	4	B	11
C	4	C	10
D	5	D	7
F	4	F	1
TOTALS	17	TOTALS	36

$\overline{X}_9 = 1.470$ $\overline{X}_{10} = 2.440$

APPENDIX 6

GRADE DISTRIBUTION FOR S-11 AND S-12 FALL QUARTER, 1972

S-11		S-12	
Grade	f	Grade	f
A	2	A	21
B	17	B	21
C	9	C	11
D	4	D	5
F	0	F	8
TOTALS	32	TOTALS	61

$\bar{X}_{11} = 2.531$ $\bar{X}_{12} = 2.852$

APPENDIX 7

GPA DISTRIBUTION FOR S-13 AND S-14 FALL QUARTER, 1972

S-13		S-14	
GPA	f	GPA	f
0.000 - 1.999	25	0.000 - 1.999	26
2.000 - 2.999	33	2.000 - 2.999	85
3.000 - 3.999	19	3.000 - 3.999	77
4.000 -	1	4.000 -	13
TOTALS	78	TOTALS	201

$\bar{X}_{13} = 2.295$ $\bar{X}_{14} = 2.776$

APPENDIX 8 (A)

CUMULATIVE GPA AND NUMBER OF HOURS
COMPLETED BY S-15

GPA Interval	Mean GPA	Number of Hours Completed	GPA Interval	Mean GPA	Number of Hours Completed
0.150 - 0.599			2.400 - 2.849		
	0.250	1		2.437	64
	0.562	3		2.452	106
0.600 - 1.049				2.461	13
	0.666	1		2.500	4
	0.800	2		2.571	7
	1.000	6		2.573	85
	1.000	1		2.593	86
1.050 - 1.499				2.842	57
	1.058	11	2.850 - 3.299		
	1.241	23		2.969	93
	1.457	26		3.000	4
1.500 - 1.949				3.000	3
	1.540	38		3.027	72
	1.551	62		3.038	105
	1.615	10		3.054	73
	1.684	10		3.075	80
	1.785	10		3.150	20
	1.794	34		3.176	34
	1.846	10	3.300 - 3.750		
	1.857	4		3.352	34
	1.875	16		3.384	13
	1.939	83		3.404	47
1.950 - 2.399				3.486	76
	1.974	71		3.500	2
	2.025	37		3.551	98
	2.146	36		3.708	103
	2.230	10			
	2.256	74			
	2.300	70			

APPENDIX 8 (B)

CUMULATIVE GPA AND NUMBER OF HOURS COMPLETED BY S-15

GPA Interval

Number of Hours Completed	0.150 through 0.599	0.600 through 1.049	1.050 through 1.499	1.500 through 1.949	1.950 through 2.399	2.400 through 2.849	2.850 through 3.299	3.300 through 3.750	TOTAL
101 - 110						1	1	1	3
91 - 100							1	1	2
81 - 90				1		2			3
71 - 80					2		3	1	6
61 - 70				1	1	1			3
51 - 60						1			1
41 - 50								1	1
31 - 40				2	2		1	1	6
21 - 30			2						2
11 - 20			1	5		1	1	1	9
0 - 10	2	4		1	1	2	2	1	13
TOTAL	2	4	3	10	6	3	9	7	49

APPENDIX 8 (C)

GRADE DISTRIBUTION BY SUBJECT AREAS FOR S-15

Subject Area	A	B	C	D	F/WF	Total Grades	GPA
Accounting	12	6	7	4	0	29	2.897
Architecture	2	2	0	0	0	4	3.500
Arts	5	2	13	3	1	24	2.292
Biology	0	9	14	8	2	33	1.909
Business Management	5	7	6	4	0	22	2.591
Chemistry	5	0	1	0	2	8	2.750
Data Processing	0	4	3	2	1	10	2.000
Drafting	2	4	2	0	2	10	2.400
Economics	7	10	7	0	2	26	2.769
Education	0	0	1	0	0	1	2.000
Electricity	15	2	3	0	0	20	3.600
Engineering	5	6	2	0	0	13	3.231
English	10	27	39	10	7	93	2.247
French	1	7	6	1	2	17	2.235
Geography	2	0	0	0	0	2	4.000
Government	4	12	4	1	1	22	2.773
History	14	25	21	7	5	72	2.500
Industry	2	2	1	0	0	5	3.200
Marketing	1	1	0	0	0	2	3.500
Mathematics	15	23	14	6	4	62	2.629
Mechanical Engineering	3	1	0	0	0	4	3.750
Natural Science	7	3	3	0	0	13	3.308
Philosophy	0	0	0	0	1	1	0.000
Physical Education	20	20	8	0	3	51	3.059
Physics	4	4	2	0	0	10	3.200
Psychology	7	17	12	2	1	39	2.692
Secretarial Science	0	1	2	0	2	5	1.750
Social Science	0	8	2	1	1	12	2.417
Sociology	0	21	12	5	4	42	2.190
Spanish	0	2	4	1	0	7	2.143
Speech and Drama	1	0	5	0	4	10	1.400

APPENDIX 8 (D)

GRADE DISTRIBUTION BY DIVISIONS FOR S-15

Division	Subject Area	A	B	C	D	F/WF
BUSINESS						
	Accounting	12	6	7	4	0
	Business Management	5	7	6	4	0
	Data Processing	0	4	3	2	1
	Economics	7	10	7	0	2
	History	14	25	21	7	5
	Marketing	1	1	0	0	0
	Physical Education	20	20	8	0	3
	Secretarial Science	0	1	2	0	2
	TOTALS	59	74	54	17	13
COMMUNICATIONS AND HUMANITIES						
	Arts	5	2	13	3	1
	English	10	27	39	10	7
	French	1	7	6	1	2
	Philosophy	0	0	0	0	1
	Spanish	0	2	4	1	0
	Speech and Drama	1	0	5	0	4
	TOTALS	17	38	67	15	15
ENGINEERING TECHNOLOGIES						
	Architecture	2	2	0	0	0
	Drafting	2	4	2	0	2
	Electricity	15	2	3	0	0
	Engineering	5	6	2	0	0
	Industry	2	2	1	0	0
	Mechanical Engineering	3	1	0	0	0
	TOTALS	29	17	8	0	2

GRADE DISTRIBUTION BY DIVISIONS FOR S-15

Division	Subject Area	A	B	C	D	F/WF
NATURAL SCIENCES AND MATHEMATICS						
	Biology	0	9	14	8	2
	Chemistry	5	0	1	0	2
	Geography	2	0	0	0	0
	Mathematics	15	23	14	6	4
	Natural Science	7	3	3	0	0
	Physics	4	4	2	0	0
	TOTALS	33	39	34	14	8
PUBLIC SERVICES						
	Education	0	0	1	0	0
	Government	4	12	4	1	1
	Psychology	7	17	12	2	1
	Social Science	0	8	2	1	1
	Sociology	0	21	12	5	4
	TOTALS	11	58	31	9	7

APPENDIX 9 (A)

CUMULATIVE GPA AND NUMBER OF HOURS
COMPLETED BY S-17

GPA Interval	Mean GPA	Number of Hours Completed	GPA Interval	Mean GPA	Number of Hours Completed
0.600 - 1.024			1.875 - 2.299		
	0.625	2		1.960	98
	0.625	2		1.970	65
	0.636	6		1.974	71
	0.666	8		2.000	1
	0.666	8		2.000	9
	0.809	12		2.000	11
	0.846	17		2.022	39
	0.896	12		2.046	65
1.025 - 1.449				2.052	18
	1.093	36		2.066	42
	1.119	27		2.142	4
	1.136	13		2.142	7
	1.160	16		2.153	33
	1.205	27		2.213	58
	1.250	10		2.232	56
	1.333	12		2.298	57
	1.384	10	2.300 - 2.724		
1.450 - 1.874				2.408	90
	1.454	8		2.415	50
	1.467	58		2.430	83
	1.600	11		2.628	65
	1.692	22	2.725 - 3.149		
	1.765	60		2.726	84
	1.777	77		2.727	83
	1.786	73		2.750	74
	1.805	55		2.944	72
	1.813	60		3.027	72
	1.835	60		3.148	54
	1.835	61	3.150 - 3.575		
				3.283	61

APPENDIX 9 (B)

CUMULATIVE GPA AND NUMBER OF HOURS COMPLETED BY S-17

GPA Interval

Number of Hours Completed	0.600 through 1.024	1.025 through 1.449	1.450 through 1.874	1.875 through 2.299	2.300 through 2.724	2.725 through 3.149	3.150 through 3.575	TOTAL
91 - 100				1				1
81 - 90					2	2		4
71 - 80			2	1		3		6
61 - 70			1	2	1		1	5
51 - 60			5	3		1		9
41 - 50				1	1			2
31 - 40		1		2				3
21 - 30		2	1					3
11 - 20	3	3	1	2				9
0 - 10	5	2	1	4				12
TOTAL	8	8	11	16	4	6	1	54

APPENDIX 9 (C)

GRADE DISTRIBUTION BY SUBJECT AREAS FOR S-17

Subject Area	A	B	C	D	F/WF	Total Grades	GPA
Accounting	3	3	5	0	0	11	2.818
Architecture	0	2	1	0	0	3	2.667
Arts	0	0	4	1	0	5	1.800
Biology	3	15	37	4	5	64	2.110
Business Management	1	9	7	12	2	31	1.839
Chemistry	0	1	1	2	1	5	1.400
Data Processing	3	2	6	1	5	17	1.824
Drafting	0	3	1	0	1	5	2.000
Economics	2	6	17	3	2	30	2.100
Electricity	1	4	5	1	2	13	2.077
English	3	28	58	27	21	137	1.745
Engineering	4	4	1	2	2	13	2.462
French	0	0	4	0	1	5	1.600
Geography	2	2	0	0	0	4	3.500
Government	3	8	8	5	5	29	1.966
History	18	25	18	16	15	92	2.163
Industry	0	1	1	2	0	4	1.750
Law Enforcement	2	4	7	2	0	15	2.400
Marine Science	14	5	1	0	0	20	3.650
Mathematics	2	24	25	14	20	85	1.694
Mechanical Engineering	0	1	0	0	0	1	3.000
Natural Science	2	0	4	1	1	8	2.000
Philosophy	0	0	1	0	0	1	2.000
Physical Education	42	37	17	0	3	99	3.162
Physics	1	4	3	2	1	11	2.182
Psychology	2	16	22	4	3	47	2.213
Radio and Television	3	1	3	1	0	8	2.750
Secretarial Science	0	0	0	4	0	4	1.000
Social Science	2	2	3	1	1	9	2.333
Sociology	0	13	20	7	3	43	2.000
Spanish	0	3	5	1	1	10	2.000
Speech and Drama	0	6	9	2	3	20	1.900

APPENDIX 9 (D)

GRADE DISTRIBUTION BY DIVISIONS FOR S-17

Division	Subject Area	A	B	C	D	F/WF
BUSINESS						
	Accounting	3	3	5	0	0
	Business Management	1	9	7	12	2
	Data Processing	3	2	6	1	5
	Economics	2	6	17	3	2
	History	18	25	18	16	15
	Physical Education	42	37	17	0	3
	Secretarial Science	0	0	0	4	0
	TOTALS	69	82	70	36	27
COMMUNICATIONS AND HUMANITIES						
	Arts	0	0	4	1	0
	English	3	28	58	27	21
	French	0	0	4	0	1
	Philosophy	0	0	1	0	0
	Radio and Television	3	1	3	1	0
	Spanish	0	3	5	1	1
	Speech and Drama	0	6	9	2	3
	TOTALS	6	38	84	32	26
ENGINEERING TECHNOLOGIES						
	Architecture	0	2	1	0	0
	Drafting	0	3	1	0	1
	Electricity	1	4	5	1	2
	Engineering	4	4	1	2	2
	Industry	0	1	1	2	0
	Mechanical Engineering	0	1	0	0	0
	TOTALS	5	15	9	5	5

GRADE DISTRIBUTION BY DIVISIONS FOR S-17

Division	Subject Area	A	B	C	D	F/WF
NATURAL SCIENCES AND MATHEMATICS						
	Biology	3	15	37	4	5
	Chemistry	0	1	1	2	1
	Geography	2	2	0	0	0
	Marine Science	14	5	1	0	0
	Mathematics	2	24	25	14	20
	Natural Science	2	0	4	1	1
	Physics	1	4	3	2	1
	TOT.	24	51	71	23	28
PUBLIC SERVICES						
	Government	3	8	8	5	5
	Law Enforcement	2	4	7	2	0
	Psychology	2	16	22	4	3
	Social Science	2	2	3	1	1
	Sociology	0	13	20	7	3
	TOTALS	9	43	60	19	12

APPENDIX 10 (A)

CUMULATIVE GPA AND NUMBER OF HOURS
COMPLETED BY S-19

GPA Interval	Mean GPA	Number of Hours Completed	GPA Interval	Mean GPA	Number of Hours Completed
0.300 - 0.649			2.050 - 2.399		
	0.360	7		2.075	37
	0.535	9		2.076	78
	0.636	4		2.101	76
0.650 - 0.999				2.117	17
	0.653	11		2.123	82
	0.833	9		2.231	88
	0.833	9		2.250	38
	0.944	10		2.279	80
	0.965	19		2.296	48
	0.966	18		2.273	84
1.000 - 1.349				2.302	40
	1.000	3	2.400 - 2.749		
	1.043	13		2.500	34
	1.100	22		2.538	39
	1.200	19		2.545	63
	1.250	34		2.627	48
1.350 - 1.699				2.631	100
	1.411	38		2.650	40
	1.440	40	2.750 - 3.099		
	1.461	36		2.842	70
	1.500	3		2.901	51
	1.500	21		2.906	32
	1.532	67		2.914	82
	1.538	52		3.000	25
	1.542	28		3.055	54
	1.587	52		3.061	97
	1.620	44	3.100 - 3.450		
	1.636	18		3.204	44
	1.666	15		3.227	66
	1.672	47			
1.700 - 2.049					
	1.750	12			
	1.810	68			
	1.857	7			
	1.886	81			
	1.888	18			
	1.950	53			
	1.970	65			
	2.000	10			
	2.000	30			

APPENDIX 10(B)

CUMULATIVE GPA AND NUMBER OF HOURS COMPLETED BY S-19

GPA Interval

Number of Hours Completed	0.300 through 0.649	0.650 through 0.999	1.000 through 1.349	1.350 through 1.699	1.700 through 2.049	2.050 through 2.399	2.400 through 2.749	2.750 through 3.099	3.100 through 3.450	TOTAL
91 - 100							1	1		2
81 - 90					1	3		1		5
71 - 80						3				3
61 - 70				1	2		1	1	1	6
51 - 60				2	1			2		5
41 - 50				2		1	1		1	5
31 - 40			1	3		3	3	1		11
21 - 30			1	2	1			1		5
11 - 20		3	2	2	2	1				10
0 - 10	3	3	1	1	2					10
TOTAL	3	6	5	13	9	11	6	7	2	62

APPENDIX 10 (C)

GRADE DISTRIBUTION BY SUBJECT AREAS FOR S-19

Subject Area	A	B	C	D	F/WF	Total Grades	GPA
Accounting	5	10	19	8	4	46	2.087
Architecture	3	3	8	2	0	16	2.438
Arts	2	6	1	0	0	9	3.111
Biology	0	5	11	7	4	27	1.630
Business Management	9	22	24	8	2	65	2.431
Chemistry	2	3	1	0	2	8	2.375
Data Processing	2	8	13	8	3	34	1.941
Drafting	0	1	2	2	3	8	1.125
Economics	6	10	22	4	2	44	2.318
Engineering	3	2	2	3	1	11	2.273
English	0	18	57	41	11	127	1.646
Fire Science	1	5	5	0	0	11	2.636
French	2	0	1	1	1	5	2.200
Government	1	14	7	6	1	29	2.276
History	7	16	21	18	7	69	1.971
Industry	0	3	5	3	2	13	1.692
Law Enforcement	4	6	3	0	0	13	3.077
Marine Science	0	2	7	2	1	12	1.833
Marketing	2	1	1	0	0	4	3.250
Mathematics	11	19	23	20	15	88	1.898
Mechanical Engineering	1	1	1	0	0	3	3.000
Natural Science	1	3	7	3	1	15	2.000
Philosophy	0	1	2	0	0	3	2.333
Physical Education	23	27	14	1	3	68	2.971
Physics	4	2	1	1	0	8	3.125
Psychology	3	8	28	5	2	46	2.109
Secretarial Science	18	22	13	3	3	59	2.831
Social Science	0	1	1	1	1	4	1.500
Sociology	0	9	8	2	3	22	2.045
Spanish	0	2	1	0	2	5	1.600
Speech and Drama	0	4	5	8	1	18	1.667

APPENDIX 10 (D)

GRADE DISTRIBUTION BY DIVISIONS FOR S-19

Division	Subject Area	A	B	C	D	F/WF
BUSINESS						
	Accounting	5	10	21	8	7
	Business Management	9	21	23	7	2
	Data Processing	2	8	13	10	5
	Economics	6	11	21	4	2
	History	7	16	21	17	7
	Marketing	2	2	3	1	0
	Physical Education	25	27	12	1	3
	Secretarial Science	18	20	12	4	3
	TOTALS	74	115	126	52	29
COMMUNICATIONS AND HUMANITIES						
	Arts	2	6	1	0	0
	English	0	19	57	41	16
	French	2	0	1	1	1
	Philosophy	0	1	2	0	0
	Spanish	0	2	1	0	2
	Speech and Drama	0	4	5	7	2
	TOTALS	4	32	67	49	21
ENGINEERING TECHNOLOGIES						
	Architecture	3	3	8	2	0
	Drafting	0	1	2	2	3
	Engineering	3	2	2	3	1
	Industry	0	3	5	3	2
	Mechanical Engineering	1	1	1	0	0
	TOTALS	7	10	18	11	6

GRADE DISTRIBUTION BY DIVISIONS FOR S-19

Division	Subject Area	A	B	C	D	F/WF
NATURAL SCIENCES AND MATHEMATICS						
	Biology	0	5	11	7	4
	Chemistry	2	3	1	0	2
	Marine Science	0	1	5	1	1
	Mathematics	10	19	23	21	21
	Natural Science	1	3	7	3	1
	Physics	4	2	1	1	0
	TOTALS	17	33	48	33	29
PUBLIC SERVICES						
	Fire Science	1	5	5	0	0
	Government	1	14	7	7	1
	Law Enforcement	4	6	3	1	4
	Psychology	3	9	27	5	2
	Social Science	0	1	1	1	1
	Sociology	0	9	8	3	3
	TOTALS	9	44	51	17	11

APPENDIX 11

GRADE DISTRIBUTION IN ENGLISH OF REGULAR STUDENTS
AND S-15, S-17, AND S-19

English Grade Distribution For All Students

Academic Quarter	A	B	C	D	F/WF	Totals
Spring, 1971	65	136	263	90	65	619
Fall, 1972	91	291	265	84	60	791
Winter, 1972	92	254	330	100	66	842
Spring, 1972	82	225	288	78	57	730
Winter, 1973	102	225	268	87	87	769
TOTALS	432	1,131	1,414	439	335	3,751

APPENDIX 12

ENGLISH GRADE DISTRIBUTION FOR S-15, S-17, S-19
OVER SEVEN QUARTERS

Sample Group	A	B	C	D	F/WF	Total	Mean GPA
S-15	10	27	39	10	7	93	2.247
S-17	3	28	58	27	21	137	1.745
S-19	0	18	57	41	11	127	1.646
TOTALS	13	73	154	78	39	357	1.840

APPENDIX 13

ENGLISH GRADE DISTRIBUTION FOR REGULAR STUDENTS

	A	B	C	D	F/WF	Total
All Students	432	1,131	1,414	439	335	3,751
Sample Groups	- 13	- 73	- 154	- 78	- 39	- 357
Regular Students	419	1,058	1,260	361	296	3,394

APPENDIX 14

GRADE DISTRIBUTIONS BY DIVISIONS
FOR S-15, S-17, AND S-19

Division and Sample Group	A	B	C	D	F/WF	Totals
BUSINESS						
S-15	59	74	54	17	13	217
S-17	69	82	70	36	27	284
S-19	74	115	126	52	29	396
TOTALS	202	271	250	105	69	897
PER CENT OF TOTAL	22%	30%	28%	12%	8%	100%
COMMUNICATIONS AND HUMANITIES						
S-15	17	38	67	15	15	152
S-17	6	38	84	32	26	186
S-19	4	32	67	49	21	173
TOTALS	27	108	218	96	62	511
PER CENT OF TOTAL	5%	21%	43%	19%	12%	100%
ENGINEERING TECHNOLOGIES						
S-15	29	17	8	0	2	56
S-17	5	15	9	5	5	39
S-19	7	10	18	11	6	52
TOTALS	41	42	35	16	13	147
PER CENT OF TOTAL	28%	28%	24%	11%	9%	100%
NATURAL SCIENCES AND MATHEMATICS						
S-15	33	39	34	14	8	128
S-17	24	51	71	23	28	197
S-19	17	33	48	33	29	160
TOTALS	74	123	153	70	65	485
PER CENT OF TOTAL	15%	25%	32%	15%	13%	100%
PUBLIC SERVICES						
S-15	11	58	31	9	7	117
S-17	9	43	60	19	12	143
S-19	9	44	51	17	11	132
TOTALS	29	145	142	45	30	392
PER CENT OF TOTAL	7%	37%	36%	12%	8%	100%

APPENDIX 15

PER CENT GRADE DISTRIBUTION FOR S-15, S-17, AND S-19

Division and Sample Group	A	B	C	D	F/WF	Mean GPA
BUSINESS						
S-15	27%	34%	25%	8%	6%	2.687
S-17	24%	29%	25%	13%	9%	2.458
S-19	19%	29%	32%	13%	7%	2.386
COMMUNICATIONS AND HUMANITIES						
S-15	11%	25%	44%	10%	10%	2.178
S-17	3%	21%	45%	17%	14%	1.817
S-19	2%	19%	39%	28%	12%	1.705
ENGINEERING TECHNOLOGIES						
S-15	52%	30%	14%	0%	4%	3.268
S-17	13%	38%	23%	13%	13%	2.256
S-19	14%	20%	35%	20%	11%	2.000
NATURAL SCIENCES AND MATHEMATICS						
S-15	26%	30%	27%	11%	6%	2.586
S-17	12%	26%	36%	12%	14%	2.102
S-19	26%	30%	27%	11%	6%	1.850
PUBLIC SERVICES						
S-15	9%	50%	27%	8%	6%	2.470
S-17	6%	30%	42%	13%	9%	2.126
S-19	7%	33%	39%	13%	8%	2.174

APPENDIX 16

SUMMARY DATA FOR S-15, S-17, AND S-19

Sample Group	No. of Students	No. of Hrs. Completed	Mean GPA	Per Cent Grade Distribution In All Subject Areas A	B	C	D	F/WF
S-15	49	39.8	2.262	22%	34%	29%	8%	7%
S-17	54	40.5	1.855	13%	27%	35%	13%	12%
S-19	62	40.4	1.875	12%	26%	34%	18%	10%